FORT BRAGG, CA

NOYO HARBOR

39°25'40" N 123°48'20" W

Jim Hurst	Richard Shoemaker	Andrew Schlafter	Grant Downie	Domenick Weaver	Anna Neumann
Chair	Vice Chair	Commissioner	Commissioner	Commissioner	Harbormaster

Noyo Harbor Commission Meeting Agenda
Thursday August 13th 2026 6pm
Town Hall,
363 N. Main Street, Fort Bragg, CA

Call to Order

Roll Call

Pledge of Allegiance

Public Comment on Non-Agenda Items

The Noyo Harbor Commission welcomes input from the public. Please limit your comments to five minutes so that everyone may be heard. The Brown Act does not allow action to be taken on non-agenda items.

Consent Calendar

1. Minutes July 2026 Regular Meeting
2. Financial Report July 2026

Conduct of Business

1. Discussion and possible action Noyo Harbor District Icehouse Policy, Emergency Action Plan, Emergency Response Plan, & Risk Management Plan

Staff Reports and Recommendations

Geotechnical Boring Schedule

Vessel Demo Project

USACE Dredge and Jetty Repairs

Matters from the Commissioners

Attorney Report

Adjournment to the next regular meeting

FORT BRAGG, CA

NOYO HARBOR

39°25'40" N 123°48'20" W

Jim Hurst	Richard Shoemaker	Andrew Schlafer	Grant Downie	Domenick Weaver	Anna Neumann
Chair	Vice Chair	Commissioner	Commissioner	Commissioner	Harbormaster

Noyo Harbor Commission Meeting Minutes
Thursday July 9th 2026 6pm
Town Hall,
363 N. Main Street, Fort Bragg, CA

Call to Order at 6pm

Roll Call

Present: Commissioner Downie, Commissioner Weaver, Chair Hurst

Absent: Commissioner Schlafer, Vice Chair Shoemaker

Staff Present: Anna Neumann, Jim Jackson

Pledge of Allegiance

Public Comment on Non-Agenda Items

None

Consent Calendar

1. Minutes May Regular Meeting 2026
2. Minutes June Regular Meeting 2026
3. Financial Report March 2026
4. Financial Report April 2026
5. Financial Report May 2026
6. Financial Report June 2026

Motion to approve 1st Commissioner Downie, 2nd Commissioner Weaver. Approved 3-0

Conduct of Business

1. Discussion and possible action on event rate schedule

The Harbormaster gave an update on how the office developed the event rate schedule based off the conversation of the June meeting. A brief conversation followed on the installation of any hard infrastructure on Harbor District property for events that plan on running annually. It was determined that the District would want some sort of commitment before installations could occur and anything installed could not interfere with Harbor operations.
Another brief conversation was held on the ability to rent out percentages of the various locations, for example – a percentage of the parking lot. This method would allow the District to retain space if a fishing season was active during a requested event time.

Motion to approve the event schedule as present with the ability to adjust fees based on percentages of space used. 1st Commission Weaver, 2nd Commission Downie. Approved 3-0-0

2. Discussion and possible action on Euphotic Foundation Letter

The Harbormaster gave an overview of the Euphotic Foundation, their mission and the funds that were allocated to the District icehouse.
Motion to approve the Thank you Letter to the Euphotic Foundation. 1st Commissioner Weaver, 2nd Commissioner Downie. Approved 3-0-0

3. Discussion and possible action on FY 2026/2027 budget

The Harbormaster gave an update on the layout of the budget packet which has changed over the years. Ideally the new layout will allow the commission to see how the past fiscal years income and expenditure's affected the District's bottom line and how the upcoming fiscal year is expected to affect the District's finances.
The Harbormaster also ran through the numbers of the operating budget, deferred maintenance and grant matches.

Motion to approve the FY2026/2027 budget. 1st Commissioner Downie, 2nd Commissioner Weaver. Approved 3-0-0

Staff Reports and Recommendations

None

Matters from the Commissioners

Commissioner Downie gave an update on the sea otter reintroduction and Science and Fisheries Exchange Meetings (SAFE) that are occurring in Oregon and will potentially occur along the California Coast.

Commissioner Weaver asked the Harbormaster about the ADA parking issues that we brought up in public comment at the June meeting. The Harbormaster is looking into it and the legal requirements.

Chair Hurst is considering stepping down from his position on the Commission in October of 2026 to allow for more time to travel in his retirement. He has been on the commission for 14 years.

Attorney Report

None

Motion for adjournment to the next regular meeting at 6:54pm. 1st Commissioner Weaver, 2nd Commissioner Downie. Approved 3-0-0

NOYO HARBOR DISTRICT
STATEMENT OF ACCOUNTS
July 31st 2026

Chase Checking	$56,396.25
Chase Money Market	$14,178.20
LAIF	$1,600,293.84
Total of all accounts	**$1,670,868.29**
Incumbered Funds	
FEMA 4683	$99,375.00
Tsumai Damage	$65,389.39
Total Unicumbered Funds	**$1,506,103.90**

Noyo Harbor District
Profit and Loss
July 2026

	Total
Income	
Electricity	2,359.80
Fish Markets	140.00
Ground Rent	1,000.00
Icehouse Income	211.00
Interest Income	15,936.67
Late Fees	1,143.55
Other Grant Proceeds	4,305.00
Park & Launch	5,130.32
Slip Rental Contract	39,073.84
Slip Rental Transient	9,131.75
Total for Income	**$78,431.93**
Gross Profit	**$78,431.93**
Expenses	
Communications Expense	213.41
Deferred Maintenance	3,440.89
Dues and Subscriptions Exp	172.99
Fuel Expense	207.56
Icehouse Maintenance	17.00
Icehouse Power	4,393.38
Insurance Property & Liability	956.88
Legal and Professional Fees	1,356.00
Office Expense	705.17
Operating Supplies	2,583.34
Payroll Expenses	
Taxes	1,693.32
Wages	22,134.52
Total for Payroll Expenses	**$23,827.84**
Power	5,187.34
Repairs & Maintenance	819.21
Sep. Ira	1,182.72
Taxes & Assessments	1,475.93
Utilities Expense	7,670.68
Total for Expenses	**$54,210.34**
Net Operating Income	**$24,221.59**
Other Expenses	
Donna J Tsunami Damage	1,940.00
FEMA 4683	990.00
SAVE	12,150.00

SCC Marina Redevelopment	73,858.28
Total for Other Expenses	**$88,938.28**
Net Other Income	**-$88,938.28**
Net Income	**-$64,716.69**

Accrual Basis Wednesday, August 05, 2026 09:36 AM GMT-07:00

July 1 2026-To date
Budget to Date

	FY Year to Date Expense	FY Budget	Monthly Budget	Monthly Expense	$ Over Budget	% of Budget
Income						
Electricity	$2,359.80	$18,000.00	1,500.00	2,359.80	-15,640.20	13.11
Encroachment Leases		$25,000.00	0.00	0.00	-25,000.00	0.00
Harbor Festival		$16,000.00	0.00	0.00	-16,000.00	0.00
Ground Rent	$1,000.00	$27,800.00	2,316.67	1,000.00	-26,800.00	3.60
Income / Mdco. County Taxes		$160,000.00	0.00	0.00	-160,000.00	0.00
Interest Income	$15,936.67	$55,000.00	15,000.00	15,936.67	-39,063.33	28.98
Late Fees	$1,143.55	$2,500.00	208.33	1,143.55	-1,356.45	45.74
Other Grant Proceeds	$4,305.00	$80,000.00	6,666.67	4,305.00	-75,695.00	5.38
Park & Launch	$5,130.32	$30,000.00	2,500.00	5,130.32	-24,869.68	17.10
Slip Rental Contract	$39,073.84	$420,000.00	35,000.00	39,073.84	-380,926.16	9.30
Slip Rental Transient	$9,131.75	$68,000.00	5,666.67	9,131.75	-58,868.25	13.43
Total Income	**$78,080.93**	**$902,300.00**	**68,858.33**	**$78,080.93**	**-$824,219.07**	**8.65**
Expense						
Advertising Expense	0	$1,000.00	83.33	0.00	-1,000.00	21.34
Communications Expense	$213.41	$4,500.00	375.00	213.41	-4,286.59	4.74
Dues and Subscriptions Exp	$172.99	$17,500.00	1,458.33	172.99	-17,327.01	0.99
Emp. Health & Dental Insurance	$0.00	$44,000.00	3,666.67	0.00	-44,000.00	0.00
Fuel Expense	$207.56	$3,300.00	275.00	207.56	-3,092.44	6.29
Harbor Festival	$0.00	$5,000.00	0.00	0.00	-5,000.00	0.00
Insurance Property & Liability	$956.88	$285,000.00	0.00	956.88	-284,043.12	0.34
Legal and Professional Fees	$1,356.00	$18,000.00	1,500.00	1,356.00	-16,644.00	7.53
Office Expense	$705.00	$10,000.00	833.33	705.00	-9,295.00	7.05
Operating Supplies	$2,583.34	$4,500.00	375.00	2,583.34	-1,916.66	57.41
Payroll Tax Expense	$1,693.32	$25,000.00	2,083.33	1,693.32	-23,306.68	6.77

July 1 2026-To date
Budget to Date

Power	$5,187.34	$62,000.00	5,166.67	5,187.34	-56,812.66	8.37
Repairs & Maintenance	$819.21	$49,300.00	4,108.33	819.21	-48,480.79	1.66
Sep. Ira	$1,182.72	$21,000.00	1,750.00	1,182.72	-19,817.28	5.63
Taxes & Assessments	$1,475.93	$3,000.00	0.00	1,475.93	-1,524.07	49.20
Travel and Conferences	$0.00	$1,000.00	83.33	0.00	-1,000.00	0.00
Utilities Expense	$7,670.68	$60,000.00	5,000.00	7,670.68	-52,329.32	12.78
Wages Expense	$22,134.52	$275,000.00	22,916.67	22,134.52	-252,865.48	8.05
Total Expense	$46,358.90	$889,100.00	$49,675.00	46,358.90	-842,741.10	5.21
Net Income	**$31,722.03**	**$13,200.00**	**$19,183.33**	**$31,722.03**	**$18,522.03**	

Date	Payee	Category	Total
07/31/202	Intuit QuickBooks Workforce	QuickBooks Tax Holding Acc	-3021.3
07/28/202	State Water Resource Control I	SCC Marina Redevelopment	4212
07/28/202	California Department of Fish a	SCC Marina Redevelopment	73.71
07/24/202	Red Rhino	Fuel Expense	85.86
07/23/202	Google	Office Expense	9.99
07/22/202	CA EDD	CA SUI / ETT	-87.02
07/20/202	Online Labels	Office Expense	360.62
07/20/202	Redwood Waste Solutions	Deferred Maintenance	3440.89
07/16/202	O'Reilly Auto Parts	Repairs & Maintenance	123.38
07/16/202	P.G.& E.	Power	106.67
07/16/202	SHN Engineers & Geologists	--Split--	1970
07/16/202	P.G.& E.	Icehouse Power	4393.38
07/16/202	The Rental Place FB	Repairs & Maintenance	25.6
07/16/202	SHN Engineers & Geologists	SCC Marina Redevelopment	0
07/16/202	Redwood Waste Solutions	Utilities Expense	6041.49
07/16/202	Redwood Waste Solutions	SAVE	0
07/16/202	SHN Engineers & Geologists	Donna J Tsunami Damage	1940
07/16/202	James A. Jackson	Legal and Professional Fees	376
07/16/202	WAXIE SANITARY SUPPLY	--Split--	1539.05
07/16/202	P.G.& E.	Power	5003.14
07/16/202		--Split--	687.23
07/16/202	Mendocino County Auditor	Taxes & Assessments	1475.93
07/16/202	P.G.& E.	Power	77.53
07/14/202	Amazon	Office Expense	61.94
07/14/202	Amazon	Office Expense	112.86
07/10/202	Verizon Wireless	Communications Expense	35.46
07/10/202	Red Rhino	Park & Launch	60
07/09/202	Adobe	Dues and Subscriptions Exp	19.99
07/08/202	Mendocino Community Networl	Communications Expense	177.95
07/07/202	Amazon	Office Expense	151.01
07/06/202	Backblaze	Dues and Subscriptions Exp	18
07/06/202	Yahoo Mail	Dues and Subscriptions Exp	5
07/03/202	City of Fort Bragg (1)	Utilities Expense	49.27
07/03/202	City of Fort Bragg (1)	Utilities Expense	49.27
07/03/202	City of Fort Bragg (1)	Utilities Expense	39.08
07/03/202	City of Fort Bragg (1)	Utilities Expense	49.27
07/03/202	City of Fort Bragg (1)	Utilities Expense	1239.18
07/03/202	City of Fort Bragg (1)	Utilities Expense	203.12
07/03/202		Park & Launch	17
07/03/202	CA EDD	CA PIT / SDI	-437.38
07/03/202	IRS	Federal Taxes (941/943/944	-2328.1
07/02/202	Quickbooks	Dues and Subscriptions Exp	130
07/02/202	Red Rhino	Fuel Expense	121.7

07/02/202	Intuit QuickBooks Workforce	QuickBooks Tax Holding Acc	-2839.4
07/01/202	Mountain Fresh	Office Expense	8.75
07/01/202	SHN Engineers & Geologists	SCC Marina Redevelopment	69572.6
07/01/202	WAXIE SANITARY SUPPLY	Operating Supplies	1044.29
07/01/202	Progressive	Insurance Property & Liabilit	956.88
07/01/202	Dean Stevenson	SAVE	3750
07/01/202	MELVIN PYORRE	SAVE	8400
07/01/202	Franklin Templeton	Sep. Ira	1182.72

Noyo Harbor District

Payroll summary by employee report

From Jul 31, 2026 to Jul 31, 2026 for all employees from all locations

Item	Total	Koski Bruce	Koski (1) Jay	Neumann A	Savedra Nick	Scofield Robert
Hours - total	**739.34**	**81.5**	**184**	**173.34**	**176**	**124.5**
Hours - Regular Pay	484.5	81.5	160	0	120	123
Hours - Overtime Pa	1.5		0		0	1.5
Hours - Sick Pay	8	0	0		8	0
Hours - Vacation Pay	86		16	30	40	
Hours - Holiday Pay	16		8		8	
Hours - Salary	143.34			143.34		
Gross pay - total	**$ 22,134.52**	**$ 1,702.54**	**$ 5,667.20**	**$ 6,482.84**	**$ 5,665.45**	**$ 2,616.49**
Gross pay - Regular I	$ 13,062.83	$ 1,702.54	$ 4,928.00	$ 0.00	$ 3,862.81	$ 2,569.48
Gross pay - Overtime	$ 47.01		$ 0.00		$ 0.00	$ 47.01
Gross pay - Sick Pay	$ 257.52	$ 0.00	$ 0.00		$ 257.52	$ 0.00
Gross pay - Vacation	$ 2,902.43		$ 492.80	$ 1,122.03	$ 1,287.60	
Gross pay - Holiday I	$ 503.92		$ 246.40		$ 257.52	
Gross pay - Salary	$ 5,360.81			$ 5,360.81		
Pretax deductions -						
Adjusted gross	**$ 22,134.52**	**$ 1,702.54**	**$ 5,667.20**	**$ 6,482.84**	**$ 5,665.45**	**$ 2,616.49**
Other pay - total	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**	**$ 0.00**
Other pay - Qualified	$ 15.67		$ 0.00		$ 0.00	$ 15.67
Employee taxes & d	**-$ 4,479.71**	**-$ 205.31**	**-$ 1,241.30**	**-$ 1,559.48**	**-$ 1,069.73**	**-$ 403.89**
Employee taxes - to	**-$ 4,479.71**	**-$ 205.31**	**-$ 1,241.30**	**-$ 1,559.48**	**-$ 1,069.73**	**-$ 403.89**
Employee taxes - Fe	-$ 1,721.53	-$ 36.08	-$ 516.99	-$ 690.40	-$ 345.75	-$ 132.31
Employee taxes - So	-$ 1,372.36	-$ 105.56	-$ 351.37	-$ 401.94	-$ 351.26	-$ 162.23
Employee taxes - Me	-$ 320.96	-$ 24.69	-$ 82.18	-$ 94.00	-$ 82.15	-$ 37.94
Employee taxes - CA	-$ 777.10	-$ 16.84	-$ 217.08	-$ 288.86	-$ 216.92	-$ 37.40

Employee taxes - CA	-$ 287.76	-$ 22.14	-$ 73.68	-$ 84.28	-$ 73.65	-$ 34.01
Employee Aftertax d						
Net pay	**$ 17,654.81**	**$ 1,497.23**	**$ 4,425.90**	**$ 4,923.36**	**$ 4,595.72**	**$ 2,212.60**
Employer taxes & co	**$ 1,693.32**	**$ 130.25**	**$ 433.55**	**$ 495.94**	**$ 433.41**	**$ 200.17**
Employer taxes - tot	**$ 1,693.32**	**$ 130.25**	**$ 433.55**	**$ 495.94**	**$ 433.41**	**$ 200.17**
Employer taxes - FU	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Employer taxes - Soc	$ 1,372.36	$ 105.56	$ 351.37	$ 401.94	$ 351.26	$ 162.23
Employer taxes - Me	$ 320.96	$ 24.69	$ 82.18	$ 94.00	$ 82.15	$ 37.94
Employer taxes - CA	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Employer taxes - CA	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00	$ 0.00
Company contributi						
Total payroll cost	**$ 23,827.84**	**$ 1,832.79**	**$ 6,100.75**	**$ 6,978.78**	**$ 6,098.86**	**$ 2,816.66**

Noyo Harbor District
Agenda Item Summary

Meeting Date:	8/13/2026
Item Number:	1
Title:	Icehouse Paperwork
Recommended Action:	Approval or Direction

Analysis

Attached are the documents that the Harbormaster has been developing in conjunction with the County of Mendocino for the final icehouse permits.

Emergency Action Plan- Details actions the Harbor District staff will take in the event of an emergency or accidental release of ammonia.

Emergency Response Plan- Details actions local emergency first responders, District staff and the general public should take in the event of an emergency or accidental release.

Icehouse Policies -Based off of Title 19 CalARP requirements, the icehouse policies explain and dictate procedure for the ammonia system within the Noyo Habor District's icehouse. The policies reference various forms and permit that have been developed in conjunction with CalARP codes and the new Icehouse Policies.

To assist with polices new permits, training records and forms for compliance have also been developed. These forms can be found in the appendix and copies of any forms will be available in a shared drive that the County has access to. The permits and forms are as follows:

Hot Work Permit

Incident Investigation Form

Contractor Evaluation

Contractor Training Record

MOC Form

Line Break Permit

Training Record

Program 3 Risk Management Plan – The RMP explains and identifies risk within the Noyo Harbor District's icehouse and the potential for an accidental release of ammonia.

Hazards Review Report – as required by California Code, the attached Hazards Review report list the hazards of the Noyo Harbor Icehouse. Appendix C has a list of recommendation that have

largely been completed in the start up process or have been completed by Harbor Staff to come into compliance.

Noyo Harbor District Emergency Action Plan

Evacuation Procedures

Main Point of Contact for all Employees

Harbormaster- Anna Neumann -805-458-4902

Secondary Points of Contact

Marina Manager- Nick Savedra – 707-624-6010

1. All employees within the Harbor Office, shop, and marina and icehouse area will immediately evacuate with either personal or work vehicles to Thanksgiving Coffee parking lot. Evacuation route can be either via South Harbor Drive or Basin Drive, whichever is closer and moves the employee away from the icehouse faster.
2. The Harbormaster will take a head count at Thanksgiving Coffee Company to ensure all employees are accounted for. Any employees unaccounted for will be noted by the Harbormaster and their last known location will be determined by interviewing the accounted for staff.
3. Any employee not within the current vicinity of the Harbor Office (i.e. working in North Harbor) will meet the remainder of the staff at Thanksgiving Coffee Company. If navigating to the Thanksgiving Coffee Company increase the exposure risk to the employee they will shelter in place or move to a safe location upwind of the icehouse.
4. Employees will not leave the area with direct consent of the Harbormaster and all employees will await directions from Emergency Services before leaving, or returning to work.
5. No employees will assist with performing any rescues or medical duties unless directed to by the Harbormaster or EMS.
6. Any reports of fire or other emergencies witnessed by the employees during the accidental release and evacuation will be reported to the Harbormaster at the muster point as soon as they arrive. The Harbormaster, who is the point of contact for emergency services will relay that information to the appropriate agency.
7. All emergency services will be directed to meet the Harbormaster at the Thanksgiving Coffee Company before proceeding into the icehouse.

Alarm Systems

1. Audio and visual alarms placed on the Icehouse will alert employees of a release who are in the immediate vicinity.
2. Employees who are not in the immediate vicinity of the alarm will be called on their work or personal phones.

FORT BRAGG, CA
NOYO HARBOR
39°25'40" N 123°48'20" W

Jim Hurst	Richard Shoemaker	Dan Platt	Grant Downie	Domenick Weaver	Anna Neumann
Chair	Vice Chair	Commissioner	Commissioner	Commissioner	Harbormaster

Emergency Response Plan

Noyo Harbor Icehouse-Fort Bragg

Emergency Contact:

Icehouse Emergency Coordinator: Anna Neumann		(805) 458-4902
Alternate E. C. Nick Savedra		(707) 537-7058
Fort Bragg Fire	911	(707) 459-7403
MCSO (Sheriff)	911	(707) 961-2421
Fort Bragg Police	911	(707) 961- 2800
USCG Noyo River	911	(206) 815-7238
National Response Center		(800)424-8802
Cal OES		(800) 852-7550
REHIT HazMat team	911	

All of the above will be notified by the direct dial alarm system should it sense the presence of ammonia in the air above 25ppm

All should be directed to temp command post @19100 S. Harbor Drive, Thanksgiving Coffee's parking lot. From there, a suitable CP will be sought.

Evacuation Plan

Hazard: Anhydrous Ammonia (600lbs)

1. Purpose

This plan establishes procedures for responding to accidental release of anhydrous ammonia to protect employees, the public, and the environment.

Ammonia is a highly toxic and corrosive gas, with exposures above 300 ppm considered immediately dangerous to life and healthy.

2. Facility Overview

- Refrigeration systems contains 600lbs of anhydrous ammonia
- Anhydrous ammonia is used as a refrigerant in the ice making process
- Operating Hours; M-F 8am-5pm. (After hours by reservation)
- Key surrounding exposures;
    - North: Boat docks (~100 ft)
    - South: 300ft parking lot
    - West: U.S. Coast Guard Station (~100ft)
    - East: Grader Park (~100ft)
- Windsocks installed on roof for real-time wind directions

3. Detection and Alarm Systems

- Fixed ammonia detection systems:
    - Audible alarms
    - Strobe lights (interior + North/South exterior walls)
- System automatically notifies
    - Facility personnel
    - Emergency dispatch (Fire &HazMat)
- Daily inspections conducted
- Semi-annual calibrations/service

4. Emergency Organization and Responsibilities
   Incident Management (Unified Command)

- Harbormaster
- Marina Manager
- Maintenance Supervisor
  (After hours: All are notified via auto-dial system)

Marina Manager

- HazMat trained (HazWOPER level)
- Responsible for:
  - Initial system assessment (if safe)
  - Technical support to responders

First Responders

- Fort Bragg Fire Department
- Mendocino County Sheriff
- Adventist Health Ambulance
- Redwood Empire Hazardous Incident Team (REHIT)

5. Emergency Classification

Incidental Release

- Small contained leak manageable by trained personnel
- No evacuation required

Emergency Release

Triggers Include:

- Unknown or uncontrolled leak
- Alarm activation
- Visible vapor cloud
- Strong ammonia odor
- Injury or exposure
- Off-site impact potential

6. Emergency Procedures

6.1 Upon Alarm Activation

- Evacuate Immediately
- Call 911
- Move upwind using windsock guidance
- Proceed to designated safe assembly area
- Do NOT attempt rescue or mitigation without proper PPE

6.2 Shutdown Procedures

- Emergency shut off switches located
  - Lower Floor
  - Upper floor (3rd story) Outside and Inside
  - Main electrical shut off switches located:
    - South side panel (clearly marked)

Shut down only if:

- Can be done safely
- No exposure risks

6.3 Isolation and Site Control

- Secure 300ft parking lot (South Side)
- Deny entry to all non-emergency personnel
- Establish zones:
  - Hot Zone: Contaminated area
  - Warm Zone: Decontamination area
  - Cold Zone: Command post

6.4 Public Protection

- Initiate Reverse 911 notification (1/4 mile radius)
- Default actions: Shelter In Place
  - Close doors/windows
  - Shut down HVAC systems
- Suggested muster points for general public along North Harbor Drive is Noyo Beach, Suggested muster points for South Harbor Drive, with the Noyo Harbor Basin would be Dolphin Isle, Hare Creek Auto Parking Lot.

6.5 Special Exposure Areas

- Boat docks (North ~100ft) A, B and C docks plus High Dock
  - Immediate notification and evacuation
- US Coast Guard Station
  - Direct communication required
- Parking Lot
  - Immediate notification and evacuation
- Makela Boat Works (Wild Blue)
  - Immediate notification and evacuation

- Coast Road
    - Immediate notification and evacuation
- Grader Park
    - Immediate notification and evacuation

7. Personal Protective Equipment (PPE)
   Minimum for responders entering hazard area:
    - SCBA – Self Contained Breathing Apparatus
    - Full protective gear

8. Medical & First Aid
   8.1 Exposure Response
    - Inhalation
        - Move victim to fresh air immediately
        - Administer oxygen if trained
    - Skin/Eyes
        - Flush with water for at least 15 minutes
    - Severe cases:
        - Immediate transport to hospital

9. Training Requirements
    - Hazardous awareness training for all employees
    - HazWOPER-level training for Marina Manager
    - Regular drills with:
        - Fire Department
        - HazMat teams

10. Coordination with Emergency Agencies
    - Pre-incident planning with
        - Local Fire Department
        - USCG
        - REHIT
        - National Response Center
        - California Office of Emergency Services

- Fort Bragg Police Department
- Mendocino County Sheriff's Office

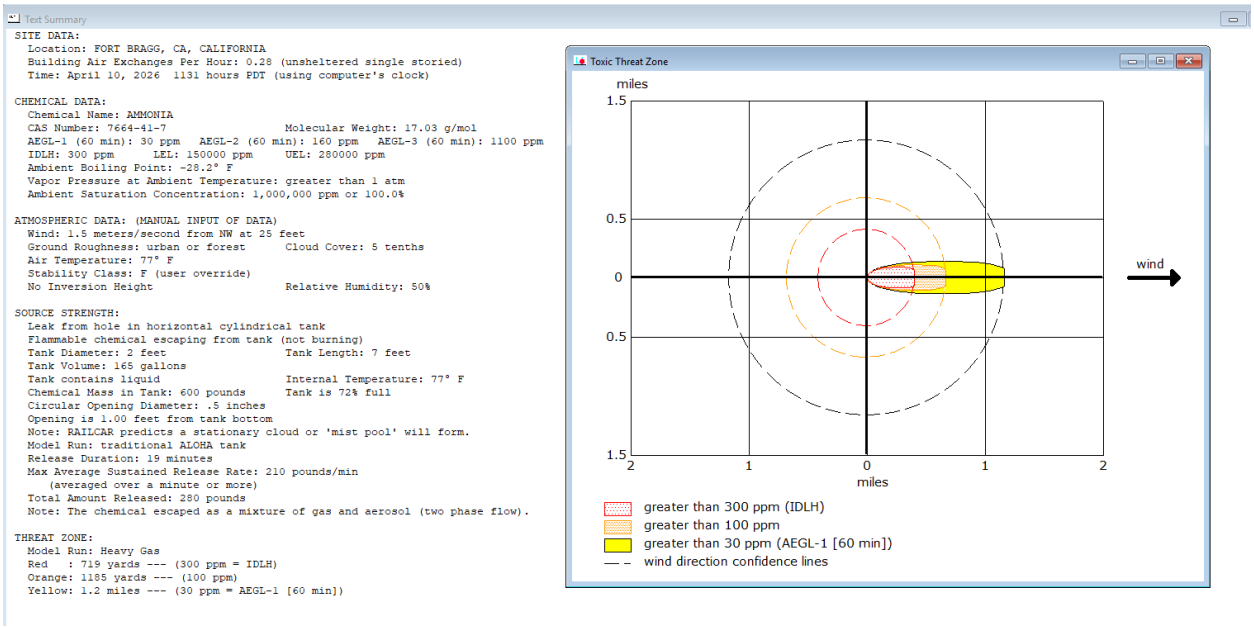
11. Post -Incident Actions
    - Incident debrief and documentation
    - System inspections and repair
    - Review and update ERP
    - Employee retraining if needed

12. Key Safety Principles
    - Evacuate first, respond second
    - Always approach from upwind
    - Assume all releases are hazardous
    - Only trained responders engage

Suggested Evacuation Area from Aloha Modeling given specifics at Icehouse and Worst Case Scenario of an accidental total release.

Evacuate all persons within 719 yards of the point source.

All people with 1.2 miles should be notified to shelter in place and a suggestion to move to a fresh air muster point up wind of the point source.



FORT BRAGG, CA
NOYO HARBOR
39°25'40" N 123°48'20" W

Jim Hurst	Richard Shoemaker	Dan Platt	Grant Downie	Domenick Weaver	Anna Neumann
Chair	Vice Chair	Commissioner	Commissioner	Commissioner	Harbormaster

Icehouse Policy

Contents

Process Safety Information

All of the process safety information required the Noyo Harbor District Icehouse will be kept in shared dive accessible at: IceHouse Shared Drive

Hard copies of the Risk Management Plan, Evacuation Plan, Hazards Analysis, Employee Training Logs, and Daily Check off's shall also be available at the Harbor Office.

Within the shared drive will also be the operations and maintenance manuals for the equipment within the icehouse, construction materials, piping and instrument diagrams, electrical classifications, relief system design and design basis, ventilation system design, design codes and standards employed, and safety systems.

Technology of Process:

Process Chemistry

The facility operates a closed-loop, single-stage, automated ammonia refrigeration system designed to support the North Star ice maker. The system operates on the principle of latent heat absorption during vaporization and latent heat rejection during condensation. Ammonia circulates continuously through the system to absorb heat from the ice-making process and reject that heat to the atmosphere via an evaporative condenser.

Six hundred pounds of high-pressure liquid ammonia is stored in the high-pressure receiver. From the receiver, liquid ammonia is supplied to the suction accumulator, which also functions as a flash cooler due to the internal cooling coil. Subcooled liquid ammonia from the suction accumulator is then supplied to the ice maker surge drum. A separate liquid line from the high-pressure receiver provides liquid injection for compressor oil cooling.

As liquid ammonia passes through the expansion device into the low-pressure side of the system, its pressure is reduced to evaporator pressure, resulting in partial flash vaporization. The surge drum supplies liquid ammonia by gravity to the North Star ice maker. Within the ice maker, low-pressure ammonia circulates through the shell side while water circulates on the opposite side of the heat exchange surface, allowing heat transfer that produces ice. The ice maker is defrosted using scheduled air defrost cycles.

Vapor-liquid phase separation occurs in the suction accumulator to ensure only dry vapor is returned to the compressor. The vessel is designed to capture and retain any entrained liquid ammonia carried over from the evaporator or surge drum, thereby preventing liquid slugging of the compressor. An internal heat exchange coil is installed within the suction accumulator to promote vaporization of any accumulated liquid ammonia. The coil provides controlled heat input to boil off retained liquid refrigerant, ensuring that vapor returned to the compressor remains in a dry, superheated state under normal operating conditions.

Low-pressure ammonia vapor exiting the suction accumulator is then compressed to a high-pressure, superheated vapor state and discharged to the evaporative condenser.

In the evaporative condenser, high-pressure vapor is first desuperheated and then condensed to high pressure saturated liquid through heat rejection to water and air. Water is sprayed over the condenser coils while air is drawn counterflow across the wetted surface. Evaporation of the water enhances heat removal, allowing the ammonia vapor to condense. The resulting high-pressure liquid drains by gravity back to the high pressure receiver, completing the cycle.

Maximum intended inventory

This system will contain no more than 600 pounds of anhydrous ammonia.

Safe Operating Limits	Deviations / Consequences	Actions to Avoid / Correct
Suction Pressure		
Suction Pressure Range: **2-10 psig**	**Low Suction Pressure** may result in inefficient operation. Ultimate Consequence: No flow. **High Suction Pressure** may result in temperature not being maintained and potential product loss.	• **Below 2 psig:** Unload and shutdown compressors. • Low suction pressure alarm • Low suction pressure cutout **Above 10 psig:** Make sure l compressor is fully loaded and Investigate. Complete shift log for the Machinery Room
Discharge Pressure		
Discharge Pressure Range: **110-175 psig** Fluctuates based on ambient weather and operating conditions.	Too low pressure will result in no oil cooling. Increased oil temperature will damage compressors.	**Below 110 psig:** Shut off condenser fans and water pumps as needed. **Above 175 psig:** System shuts down. Investigate
High Discharge Cutout: **185 psig** Maximum Discharge Pressure: **195 psig**	Compressors alarm at **175 psig** and shut down at 185 **psig**. The pressure relief valves on the vessel and compressor vent to the vessels at **250 psig.** Ultimate Consequence: Exceed equipment design capacity and release ammonia	System shutdown to reduce discharge pressure. Emergency E-Stop Button on each compressor and System E-Stop.
Discharge Temperature		
Discharge Temperature Range: **85-195F°F.**	High oil temperature, high oil pressure. Compressors shutdown.	• High discharge temperature alarm • High oil temperature cutout
Lubrication Oil Temperature		
Normal Lubrication Oil Temperature: **80-155** °F.	Too high/low oil temperature Compressor shuts down. Loss of compressor lubrication may result in compressor seal damage and a release of ammonia. Ultimate Consequence: damage to equipment, potential release of ammonia.	• High oil temperature alarm/cutout • Low oil temperature alarm /cutout

Process Hazards Analysis

The Process Hazards Analysis will be made available at the Harbor Office and via the shared drive accessible at: IceHouse Shared Drive

To ensure the PHA meets requirements the Harbor District will hire a reputable firm to complete this work. Recommendations within the PHA will be given work load priority by Harbor staff. Completion of recommendation will be recorded within the PHA checklist.

The PHA shall be performed by a team with expertise in engineering and process operations, and the team shall include at least one employee who has experience and knowledge specific to the process being evaluated.

The PHA will be updated every five years or as required by changes in the process.

The Harbor District will retain PHAs, updates and revalidations for each process for the life of the process.

The Harbor District will review the PHA with employees, train new employees on the contents of the PHA and update employees any time a change is made to the PHA.

Operating Procedures

The Noyo Harbor District will have Standard Operating Procedures that detail the initial start up, normal operations, temporary operations, emergency shut downs, emergency operations, normal shutdowns and start ups following a turnaround or after an emergency shutdown.

Harbor District staff will be trained and have access to operating procedures, and manuals at all times.

Health and Safety Considerations

The Harbor District shall ensure that all operating protocols implemented allow for a safe working environment for employees and contractors.

The system will not be operated if ammonia is detected either via smell or via the ammonia detection system.

The system will not be operated if any deficiencies or issues are identified in the daily inspections.

The system will not be operated if the eye wash station is not functioning properly.

Operating Limits

This system will not be operated if the outside ambient temperature exceeds 100 degrees Fahrenheit or is below 30 degree Fahrenheit.

The system will not be operated if there is a direct and immediate threat of a power outage, tsunami or other natural disaster or winds exceed 100 knots.

Noyo Harbor District Standard Operation Procedures for Ice Production

Normal Operations for Ice Production

Step 1 – Complete daily log sheet.

Step 2- Bottom floor, push “START” on main panel. The button will turn green.

Step 3- Go to top floor. On computer home screen, push and hold “START” at the lower mid left of screen. The button will turn green.

Normal Shut Down for Ice Production

Step 1-Press “STOP” on bottom panel. Light should turn red.

Step 2 -Go to top floor. On computer home screen, hit “STOP”. Light should turn red.

Temporary Operations – Non-ice production days

On days where ice is not being made, staff will complete the daily log sheet

Emergency Shut-Down

To initiate an emergency stop, hit any of the emergency stop buttons on the top or bottom floors of the icehouse.

To initiate a full power shut down, pull down the level in the main power control box on the Eastern side of the icehouse, labeled “main power shut-off”.

Ice Delivery

Step 1 – At either ice delivery station, reset the ice counter.

Step 2 – Press “START”

Wait at least 20 seconds for ice to arrive at delivery stations.

Step 3- Press “STOP”.

Step 4- Record amount delivered for billing

Start Up Procedures following an emergency shut down

If an emergency stop is hit for any reason, re-set the stop buttons. Go the top control panel and resolve any error codes or emergency error codes listed on the screen. If error codes cannot be resolved or cleared, contact North Star Ice to review error codes and ensure start up can safety take place.

To restart after a main power shutdown, ensure that all interior computers, switches and systems are set to “off”. Flip main power system back on. Start at the top floor switching the main computer back on, clearing error codes or contacting North Star to review error codes.

Turn on the bottom floor ice maker system.

After any emergency or main power emergency shutdown, contact Fort Bragg Electric, North Star Ice or ACCOP to ensure the reason for the shutdown is safety resolved and the emergency shut down has not compromised the system.

Emergency Operations

In the event of an emergency (natural disaster, terrorism threat/attack) the King Values will be shut to ensure only a breach of the High Pressure Receiver tank will result in an accidental release of anhydrous ammonia.

King values will only be opened once the threat has passed and it is readily apparent no damage took place to the system (i.e. a tsunami wave never arrived or never breached the marina). If there is a likelihood of damage, the Noyo Harbor District will hire a licensed refrigeration technician to inspect the system prior to opening the King Values and run system diagnostics with North Star Ice.

Training Procedures

Employee Training Plan

1. At least 2 Harbor District employees will have undergone a site specific training with a certified Refrigeration Engineers and Technicians Association (RETA) trainer.
2. At least 1 Harbor District employee will have undergone a 40 HAZWOPER training. The employee with the HAZWOPER training will be required to complete all refresher trainings in accordance with OSHA and the HAZWOPER certification.
3. Training will take place as new employees are hired.
4. For current employees, training will take place annually at staff in-services.
5. If icehouse operations is added into an employees the Scope of Duties, the employee will be trained at the level required to safety compete their tasks.

All employees will be trained on the SOP prior to any operations of the equipment. Trainings will be conducted by the most senior employee or by a licensed technician, depending on training type and the duties the employee is expected to carry out.

The Harbormaster will be responsible for ensuring employees are competent in icehouse operations prior to working in or with the system. For employee's undergoing HAZWHOPER or RETA trainings, the trainer or course director providing the training will be responsible for ensuring employee's have passed the course prior to issuing a certification of completion.

Training records will be kept by the Harbormaster in the Harbormaster office and are available for review by request. Any updates or training refreshers will be recorded in the Training Records document and signed off by the Harbormaster or course director who offered the training.

Anhydrous ammonia poses significant health and safety risks.
Exposure to this chemical can lead to severe health issues, including:

Health Risks

- Corrosive Effects: Anhydrous ammonia can cause burns to the skin, eyes, throat, and lungs. High levels of exposure may result in lung damage or even death.
- Irritation: Most individuals will experience irritation or a strong smell that indicates exposure.

Flammability and Explosive Potential

- Anhydrous ammonia is not flammable under normal conditions, but it can become explosive when mixed with air in certain concentrations. Proper handling and storage are crucial to prevent accidents.

Industrial Hazards

- Widely used in agriculture and refrigeration, anhydrous ammonia requires strict safety protocols to mitigate risks. Incidents involving improper handling can lead to life-changing consequences.

Mechanical Integrity

To ensure the integrity of pressure vessels and storage tanks, piping systems, relief and vent systems and devices, emergency shutdown systems, control (including monitoring devices and sensors, alarms and interlocks) pumps that Noyo Harbor District employees will conduct daily inspections of the facility and maintain contracts with a reputable, license ammonia technicians.

The Daily Inspection will investigate the following:

- Screw compression
    - Suction PSI
    - Discharge PSI
    - Oil PSI
    - Suction Temperature
    - Discharge Temperature
    - Oil level in Sight glass
    - Total Run Hours
- Condenser Pump and Fans
    - Checks for water leaks
    - Checks for belt condition
    - Checks for fans
- High Pressure Receiver
    - Oil level in sight glass and how many are full
- Suction Accumulator
    - Oil level in sight glass and how many are full
- Ammonia Detectors
    - In good condition
    - If alarms have been detected
- North Star Ice Maker
    - Leaks, rust, scale and bacteria growth
    - Plugged nozzels
    - Abnormal sounds or vibration
    - Fan belts
- Ice Rake Systems
    - Rake alignment
    - Flight pad wear
    - Hoist cable condition
    - Delivery auger and bearing condition
    - Rake gear drive
    - Bin door condition
    - Refrigeration unit operating properly and temperature
- Air Chillers and Delivery Systems
    - Oil level in blower
    - Blower operating condition, unusual sounds
    - Condensing unit operating
    - Leaks
    - Delivery auger

Quarterly and bi-annual inspections will conducted by a licensed refrigeration technician will be conducted and scheduled by the Harbormaster.

System walkthrough inspection will investigate the following:

- Annual Compressor Inspection on (1) Screw Compressor Packages.
- Semi-annual Ammonia Detector Calibrations in accordance with industry standards. Provide
- documentation of calibrations along with a sensor calibration history spreadsheet.
- Annual Valve Exercising
- Annual Ammonia Purity Test (NH3/Water Analysis).
- Annual Oil Analysis on Screw compressor packages. Will provide documentation and findings.
- Annual Vibration Analysis on Screw compressors and provide supporting documentation.
- Provide annual IIAR-6 Safety Inspections and required IIAR-6 Safety Testing.
- Complete IIAR-6 inspection forms on all ammonia refrigeration equipment
- associated with the ammonia refrigeration system and provide detailed IIAR-6
- report and findings.
- Provide Inspection and Testing of all System and Control Alarms and Shutdowns.

Any deficiencies will be documented and reported directly to the Harbormaster and Lead Maintenance. The Harbormaster and Lead Maintenance will confer on the ability of staff to fix the deficiency in house or if they should bring in a license refrigeration technician. Equipment deficiencies that are outside acceptable limits shall be corrected before further use or appropriate interim safeguards shall be implemented until permanent repairs can be completed.

Any replacement parts or work will be done at the highest level to ensure quality assurance. Replacement equipment, spare parts, and repairs shall be suitable for ammonia refrigeration service and shall meet the original design specifications or an approved engineering equivalent. Installation and repairs shall be performed in accordance with manufacturer recommendations and applicable codes and standards

Inspection and maintenance activities shall be performed in accordance with applicable IIAR standards, manufacturer recommendations, and recognized and generally accepted good engineering practices (RAGAGEP)

Management of Change

These procedures apply to changes in process chemicals, technology, equipment, and procedures, except for replacements in kind.

The Noyo Harbor District commission will be responsible for final approval of any changes. Changes will can submitted to the commission by the Harbormaster, Noyo Harbor District staff or County of Mendocino.

A record of approved changes will be kept by the Harbormaster in the Harbormaster office and available for review by request.

Management of Change form can be found in the appendix on page 12

The procedures are as follows:

1. The technical basis for the process change
2. The impact of the change on safety and healthy
3. Modifications to and/or the development of new operating and maintenance procedures
4. Necessary time period for the change
5. Authorization requirements for the proposed change
6. Changes in employee training requirements
7. If applicable, updates to the NHD Icehouse policies, and process safety information contained in this document.
8. If applicable, updates to the operating procedures and practices, changes in the written procedures (daily check off) to maintain integrity of process equipment and mechanical integrity.

9. If applicable updates to the PSI will be completed prior to start up.
10. If applicable, employees will be trained on the new/updated system prior to start up. SOP will also be updated to reflect any new operating procedures.

Pre-Start up Safety Review

Prior to the start up of the system, NHD staff will inspect equipment and follow the start up procedures as outlined by North Star Ice. The Pre-Start Up Safety Review shall involve employees with expertise in process operations and engineering. The employees will be selected based upon their experience and understanding of the process systems being evaluated.

In the event of significant process change to the system, the Harbor District staff will be trained in the new start up procedures prior to the operation of the equipment. Records of this training will be noted in the training documents.

Prior to start up the Harbor District ensures all elements of the mechanism are sound and designed in accordance with design specifications by requesting certified drawings of each piece of equipment in the process. This includes the suction accumulator, high pressure receiver and hot oil pot. All ventilation calculations are also required prior to start up. All electrical drawing and flows for systems will be reviewed prior to start up.

Prior to start up all safety, operating, maintenance and emergency procedures are in place and are adequate.

A PHA will be completed prior to start up and recommendations within the PHA will be resolved or addressed for facility resolution.

Any issues found prior to start up will be documented by the Harbormaster and available for review by all employees in the Harbormaster office.

All personnel will be trained in accordance with the training plan prior to start up.

Start up will take place under the direct supervision of licensed refrigeration technicians and North Star Ice.

Compliance Audits

The Harbormaster will be responsible for compliance audits and the record keeping of all compliance paperwork.

Compliance audits will comprise:

1. A review of the IIRA -9
2. A review of the HPA
3. A review of the NHD Icehouse Policy
4. A review of the SOPs
5. A review of the NHD training records

Audits will be conducted once every three years by at least one person knowledgeable in the process.. A report of the scope, methods used, results and findings shall be developed and available for UPA review.

The reviewer will determine and document an appropriate response to each of the findings of the compliance audit. The Noyo Harbor District will enter into an agreement with the UPA on a timetable for resolution of these findings. Otherwise, these responses shall be completed one and one-half (1.5) years after performing the compliance audit. The Harbormaster shall document the actual completion dates when deficiencies were corrected.

Any issues or deficiencies that arise from the audits will be priority to fix. These corrected actions will be presented to the Harbormaster in written form and resolutions will be noted within the same document.

The Harbormaster will retain the two most recent compliance audit reports.

Incident Investigations

Incident Report Forms can be found in the Appendix on Page 7.

Noyo Harbor District will investigate any incident which resulted in , or could have resulted in a catastrophic release. Reports will be filled out by the employee involved in the incident. If the employee is unable to fill out the report for whatever reason the Harbormaster will be responsible for filing the report.

Reports will be filed to the Harbormaster within 48 hours of the incident.

The report will document:

1. Date the investigation began
2. A description of the incident, including all of the data required under 5080.9(b)
3. Recommendations resulting from the investigation

The Harbormaster, Marina Manager, one District Commissioner and the Fire Marshall shall comprise the incident investigation team to assess the incident.

The Harbormaster will be responsible for the resolutions and corrective actions. Recommendations that arise from the incident investigation will be attached to the original report and kept by the Harbormaster 5 years. The implementation of any recommendations will be the responsibility of the Harbormaster to implement and communicate with staff. If these recommendations require changes to the SOP or trigger changes in the system process it will be the responsibility of the Harbormaster to ensure those changes are reflected in all subsequent documents and communicated to all interested parties. A log of all corrective actions, and methods by which they were corrected, will be kept by the Harbormaster.

The report shall be review with all affected personnel whose tasks are relevant to the incident findings.

If necessary, reports will be shared with OSHA, the County of Mendocino, or State of California to ensure proper management of the situation.

Reports can also be shared with workman's compensation insurance.

Reports will be kept for 5 years.

Employee Participation

The Process Hazardous Analysis shall be reviewed with all employees that work on, in or near the icehouse. The plan, completed 3.15.2026, is available in printed or electronic form in the Harbormaster office.

The Emergency Action Plan (EAP), Standard Operating Procedures (SOP), and PHA are available to all employees at the Harbormasters office and will be reviewed during the annual in-service trainings. During the in-service training, employees will have the opportunity to raise concerns or suggestions to SOP's , the EPA and PHA.

In the event that, an accidental release or other incident has occurred, a staff meeting will be held to review the incident, recommendations and corrective actions with staff.

Any time there is a change to the SOP, EPA, or PHA, a staff meeting or in-service will be held.

Hot Work Permit

Before any hot work is performed at or within the icehouse, the Noyo Harbor District will review the work and issue a permit.

See permit in Appendix page 5

The hot work permit indicate the date(s) authorized for hot work; and identify the object on which hot work is to be performed. The contractor and Harbormaster will work with North Star Ice to ensure that any hot work projects do not compromise the integrity of the system. Hot work will only be permitted if the contactor or employee holds valid license, certifications or required training to safety complete the work.

The contractor or employee will be made aware of fire hazards and prevention methods prior to the start of work as noted in Section 5189 of Title 8 of CCR. The harbormaster shall issue and implement instructions on fire prevention and suppression procedures based upon the requirements contained in American National Standards Institute (ANSI/ASC) Z49.1-94, Safety In Welding, Cutting and Allied Processes, Chapters 3 and 6 and National Fire Protection Association (NFPA) 51B-2009, Standard for Fire Prevention During Welding, Cutting.

The Harbor District will work with the Fire Marshall to ensure fire prevention methods are reasonable, and will defer to the Fire Marshall to inspect fire prevention steps prior to beginning any hot work. The Harbor District and contractor shall carry out any recommendations made by the Fire Marshall before hot work begins.

If necessary welding blankets, curtains and pads shall be approved for their intended use.

All hot work permits will be reviewed by the Noyo Harbor District commission and all permits, approved or denied will be retained by the Harbormaster.

Contractors

The Noyo Harbor District will only contract with firms or companies that are reputable and hold valid licenses, certifications and trainings to complete the contracted work.

The Harbor District will seek out potential contractors by releasing request for qualifications or by following federal procurement processes if the work exceeds $25,000 or is grant funded.

Potential Contractors will have 30 days to respond to the request for qualifications and final selection of contractors will be made at a regular Noyo Harbor District commission meeting.

Prior to work beginning the Harbor District will inform the contractors of the known potential fire, explosion or toxic release hazards related to the work.

The Harbor District will explain to the contractor the applicable provisions of Article 8.

The Harbor District will work with the contractor to develop and implement safe work practices.

The Harbor District will periodically evaluate and document the performance of the contractors in fulfilling their obligations.

The Harbor District shall work with the contract owner to ensure that any and all employees working under the contract are appropriately trained for their tasks.

The Harbor District will keep record of the contract employees, their trainings and qualifications.

The Harbor District shall share all safety and emergency procedures with the contract owner and their employees.

The Harbor District shall require that any hazards identified by the contractor be reported to the Harbormaster immediately.

The Harbor District shall ensure that the contract owner or operator has informed each of its employees of the work practices necessary to safely perform his or her jobs, including but not limited to: the potential hazards related to their jobs; applicable refinery safety rules; and in the applicable provisions of the stationary source's emergency action plan.

Contractor Safety Evaluation form can be found in the Appendix page 1

Contractor Evaluation form is on page 2 of the Appendix.

Contractor orientation can be found on page 19 of the Appendix.

Appendix

Contractor: _____

Job description: _____ Date Work Started: _____

Contractor and Subcontractor employees are trained to safely perform their jobs?	☐ Yes ☐ No
Is there documentation?	☐ Yes ☐ No
Were they instructed in all known fire, explosion, toxic release, other process hazards, and concealed dangers related to their jobs?	☐ Yes ☐ No
Were they trained in all applicable provisions of the Emergency Action / Response Plan in effect while they were working at this facility?	☐ Yes ☐ No
Did they Contractor make known or create any unique hazards?	☐ Yes ☐ No
Did any Contractor employee suffer any injury or illness as a result of their work at this facility? If yes, attach explanation.	☐ Yes ☐ No
Are Contractor and Subcontractor employees complying with the Lockout/Tagout procedures?	☐ Yes ☐ No
Are Contractor and Subcontractor employees complying with the Hot Work Permit procedures?	☐ Yes ☐ No
Are Contractor and Subcontractor employees wearing appropriate PPE for their jobs?	☐ Yes ☐ No
Are Contractor and Subcontractor employees complying with the Access Control and Site Security procedures for this facility?	☐ Yes ☐ No
Are Contractor and Subcontractor employees complying with the Housekeeping requirements for this facility?	☐ Yes ☐ No

Contractor Performance was:

☐ Excellent ☐ Good ☐ Poor

Remarks or Corrective Comments:

_____

_____

_____

Evaluation by: _____ Date: _____

Company Details

Date	
Company Name	
Contact Person	
Address	
Phone	
SIC Code	
What % of your work is in ammonia?	

References

Client	
Location	
Contact	
Phone	
Approximate value	
Date	

Client	
Location	
Contact	
Phone	
Approximate value	
Date	

Injury Log Details

OSHA Injury Log Data	Total Hours Worked	Total Incidents	Total Fatalities
Current Year			
Previous Year			

Have you received any OSHA (Federal or State) citations that have been affirmed or that you have not contested, within the past two years? (If yes, attach summary)	

Are you an OSHA VPP company?	

Experience Modification Rating (EMR) Details

Current Year	
Previous Year	

Safety Program Details

Process Safety Management	Y/N
Do you have experience working on or around process systems which contain anhydrous ammonia?	
Do you have experience working on or around process systems containing hazardous materials subject to 8CCR5189? If yes, please list the hazardous material(s).	
Do you have experience working on or around process systems containing flammable materials subject to 8CCR5189? If yes, please list the material(s).	

Engineering and Fabrication	Y/N
Do you have written documentation that demonstrates that you are trained and qualified to perform any engineering duties required?	
Do you have written documentation that demonstrates that you are trained and qualified to perform welding on pressure vessels?	
Do you require all your welders to be qualified per Article 9 Section VIII of Boiler and Pressure Vessel Code?	

Safety and Health Program	Y/N
Does your company have a written safety and health program?	
Does the program include processes to ensure compliance to all applicable OSHA/regulatory standards?	
Does the program include processes to ensure employees have received training/certification to perform job duties?	
Does the program include an orientation program for new employees?	
Do job-site Supervisors/Foremen receive annual safety training?	
Do job-site Supervisors/Foremen attend the OSHA 30-hour Safety Certification course?	
Does your company have weekly safety toolbox meetings?	
Does your company have daily safety toolbox meetings?	
Does your company have annual safety objectives that include:	
Reduction in number of accidents or accident rates?	
Safety programs/activities or processes to be implemented in the future?	

Do company officers have defined (written) safety responsibilities?	
Do job-site supervisors and/or foremen have defined (written) safety responsibilities?	
Do individual employee performance reviews include safety?	

Written Safe Work Programs	**Y/N**
Do you have an Injury and Illness Prevention Program?	
Do you have an Incident Reporting program?	
Do you have a Confined Space program?	
Do you have a Lockout / Tagout program?	
Do you have a Hot Work program?	
Do you have a Line Breaking program?	
Do you have a Fall Protection program?	
Do you have an Ergonomics program?	
Do you have a Hazards Communication program?	
Do you have an Electrical Safe Work program?	
Do you have a Vehicle Safety program?	
Do you have a Ladder Safety program?	
Do you have a Scaffold Safety program?	
Do you have a Respiratory Protection program?	
Do you have a Personal Protective Equipment program?	
Do you have a Hearing Protection program?	

Comments:

HOT WORK PERMIT

FOR CUTTING AND WELDING WITH PORTABLE GAS OR ELECTRIC ARC EQUIPMENT

SECTION 1

Issued By:

Date:

Permit Expires:

Building:

Work Dates:

Dept.:

Floor:

Description of Work:

Type of Work: ☐ Cutting ☐ Welding

Work Performed By: ☐ Employees Name:

☐ Outside Contractor Name:

Is work to be done on ammonia refrigeration piping or equipment? ☐ Yes ☐ No

Is fire a watch required? ☐ Yes ☐ No If yes, Name:

Is the work overhead? ☐ Yes ☐ No

Relocation of combustible materials? ☐ Yes ☐ No

Protective covering used? ☐ Yes ☐ No

Is there equipment to convey sparks? ☐ Yes ☐ No

Type of fire extinguisher required. ☐ A ☐ B ☐ C ☐ ABC ☐ Other:

Was training required? ☐ Yes ☐ No

If so what type of training?

Describe precautions required with any combustible materials:

☐ Floors?

☐ Walls?

☐ Ceilings?

☐ Roof?

☐ Atmosphere?

SECTION 2 WORK AREA INSPECTION

The Plant Manager shall inspect the work area (before issuing a Hot Work Permit) and confirm that precautions below have been taken to prevent fire. This inspection checklist shall be completed and posted in the work area with the Hot Works Permit, Section 1.

The location where the work is to be done has been inspected, all necessary precautions taken and permission is granted for this work.

Site Inspection Date/Time: _____ / _____

Area Inspected By: _____

GENERAL PRECAUTIONS

☐ Sprinkler system operable.
☐ Cutting and welding equipment in good repair.

WITHIN 35 FT. OF WORK AREA

☐ Floors swept clean of combustibles.
☐ Combustible floors wet down, covered with damp sand, metal or other shields.
☐ No combustible material or flammable liquids.
☐ Combustible and flammable liquids protected with covers, guards or metal shields.
☐ All wall and floors openings covered.
☐ Covers suspended beneath work to collect sparks.

WORK AT WALLS OR CEILINGS

☐ Construction noncombustible and without combustible covering.
☐ Combustibles moved away from the other side of the wall.

WORK ON ENCLOSED EQUIPMENT

(Tanks, containers, piping, ducts, dust collectors, etc.)

☐ Equipment cleaned of all combustibles.
☐ Opening of ammonia refrigeration systems practices followed.
☐ Containers properly purged of flammable liquid and vapors.

FIRE WATCH

☐ To be provided during and 30 minutes after operation.
☐ Supplied with fire extinguishers and small water hose.
☐ Trained in use of equipment and in sounding fire alarm.

SECTION 3 FINAL CHECK-UP

Work area and all adjacent areas to which sparks and heat might have spread (including floors above and below and on opposite sides of walls) were inspected 30 minutes after the work was completed and were found safe from fire.

Contractor:	Issued By:
Site Inspection Date/Time:	Fire Watcher:

THIS FORM SHALL BE KEPT ON FILE.

Facility Information: **Date of Incident: _____/_____/_____**

Name:	**NAICS No.:**
Chemical Released other than Anhydrous Ammonia (7664-41-7)	
Date and Time Team Commenced Investigation:	

Incident Type *(Check all that apply):*

☐ Near-Miss ☐ Vapor Release	☐ Liquid Spill ☐ Fire/Explosion	Other:

Primary Source of Release *(Check One):*

☐ Oil Drain Valve ☐ Compressor ☐ Condenser ☐ Evaporator	☐ Pump ☐ Pressure Vessel ☐ Piping ☐ Manual Valve	☐ Pressure Relief Valve ☐ Automatic Control Valve ☐ Charging Connection ☐ Other

Cause(s) Contributing to Release *(Check any that apply):*

☐ Human Factors ☐ Design Shortcoming ☐ Misapplied Equipment ☐ Power Failure ☐ Corrosion ☐ Inadequate Maintenance ☐ Earthquake	☐ Equipment Defect/ Malfunction ☐ Improper Installation ☐ Mechanical Damage ☐ Hydrostatic Expansion ☐ Hydraulic Shock ☐ Inadequate Administrative Controls	☐ Controls Failure ☐ Process Upset ☐ Other Emergency ☐ System Change ☐ Maintenance Activity ☐ Inadequate Labeling

Types of Changes Recommended to Prevent Recurrence *(Check all that apply):*

Administrative Changes	**Engineering Changes**
☐ Operating Procedures ☐ Additional Training ☐ Emergency Response Procedures ☐ Safe Work Practices ☐ Labeling/Identification ☐ Maintenance Procedures ☐ Management of Change Procedures	☐ Design ☐ Equipment ☐ Piping ☐ Safety Equipment ☐ Mechanical Protection/Access ☐ Controls

Results of Incident *(Provide Requested Information):*

Quantity release (in pounds):	Offsite Responders Notified? Yes No
Property / product damage estimate: $	On-site Impacts:
Known offsite impacts:	

Location, Time and Duration of Incident:

List Agencies Notified or Attach Document:

Circumstances Leading up to Incident:

Events and Actions as Incident Unfolded:

Investigation Team's Assessment of Root Cause of Incident & Method Used:

Investigation Team's Assessment of Contributing Factors:

Actions or Circumstances which either Helped to Minimize the Effects of the Incident or that could have Minimized the Effects:

Continue on additional pages if needed.

Team Membership (List Team Leader First):

Name	Title	Company (other than facility employees)	Approval (Initial)

Location of Team's Working and Support Documents:

Recommended Changes:

Number	Description of Change

Recommended Employee Reviews of Report:

Team Leader:	_____ Signature Date	**Approved by:**	_____ Signature Date
	_____ Name Title		_____ Name Title

Section 1 – Description & Conditions				
Permit #:	WO #:	Date Issued:		
Permit Issued By:		Date Expires:		
Location in Plant:				
Work to be performed by: ☐ In-house personnel ☐ Contractor				
Employee or Contractor's Name(s):				
Is work to be done on ammonia refrigeration piping or equipment?		☐ Yes	☐ No	☐ N/A
Is lockout / tagout required?		☐ Yes	☐ No	☐ N/A
If required, has the lockout / tagout been completed?		☐ Yes	☐ No	☐ N/A
Is a confined space entry permit required?		☐ Yes	☐ No	☐ N/A
If required, has the confined space entry permit been completed?		☐ Yes	☐ No	☐ N/A
Is a hot work permit required?		☐ Yes	☐ No	☐ N/A
If required, has the hot work permit been completed and implemented?		☐ Yes	☐ No	☐ N/A
Describe purpose of line break:				

Section 2 – Hazards & Precautions					
☐ Yes	☐ N/A	Affected machinery has all energy sources locked or tagged out and tested for zero-energy state	☐ Yes	☐ N/A	Gauges / sight glasses verify line is empty
☐ Yes	☐ N/A	P&ID's reviewed & all valves identified as part of pup-out / pump down	☐ Yes	☐ N/A	Valve's normal position noted on P&ID – must ensure it is returned to normal position
☐ Yes	☐ N/A	System involved has been isolated, purged, and vented open – Review or create SOP for task	☐ Yes	☐ N/A	All non-essential personnel have been cleared from the immediate work area. Pedestrian and vehicle traffic access has been stopped
☐ Yes	☐ N/A	Back-up personnel present (2-person operation)	☐ Yes	☐ N/A	Adequate ventilation & detection provided
☐ Yes	☐ N/A	Locations of emergency shower / eyewash stations	☐ Yes	☐ N/A	Adequate escape route in case of emergency
☐ Yes	☐ N/A	PPE in use			

( ) Face shield	( ) Non-vented goggles	( ) APR	( ) SCBA	( ) Gloves
( ) Gas monitor	( ) Chemical suit	( ) Other:		

Section 3A - Approval	
The location where this work is to be done has been examined, and all necessary precautions confirmed, and permission is hereby granted for the work.	
Approved By:	Date / Time:
Section 3B – Employee / Contractor	
Employee / contractor acknowledges requirement to have supervisor present during line break.	
Employee / Contractor Signature:	Date:
Section 3C – Closure	
Line break procedures have been completed and inspected for any associated hazards.	
Employee / Contractor Signature:	Date:
Supervisor Signature:	Date / Time:

Company Name:	**Date:**

SECTION 1: INITIATION OF MANAGEMENT OF CHANGE FORM

This section is to be completed by individual originating the MOC and forwarded to the designated individual.

Originated By: _____ **Date:** _____

Reason for Request: *(Check One)*

☐	Incident Investigation Recommendation	(REF. NO. _____)
☐	Mechanical Integrity Audit Recommendation	(REF. NO. _____)
☐	Prestart-up Safety Review Recommendation	(REF. NO. _____)
☐	Hazard Review	(DATE: _____)
☐	Change in Refrigeration Requirements	
☐	Expansion or Renovation of Facility or Systems	
☐	Other (Explain) _____	

Description of Technical Basis for Change -- Purpose, Alternatives, Reference Sketches or Drawings): (*Use additional pages if necessary*)

SECTION 2: SCREENING OF MANAGEMENT OF CHANGE FORM

*Section 2 is to be completed by the designated individual. If the requested modification constitutes a **change**, Sections 2-6 **must** be completed.*

Reviewed by: _____ Date: _____

Assess Technical Basis of Change

The modification as described in Section 1 is classified as (*please check appropriate space*):

Technical Basis	Assessment	Next Action
Is the change a replacement in kind?	☐ Replacement in kind	Change is not part of MOC procedure.
	☐ Change is not a replacement in kind	MOC procedure must be followed.
Is the modification a major or minor change?	☐ Modification is a minor change	Process hazards analysis may not be required.
	☐ Modification is a major change	Process hazards analysis may be required.
Is the change permanent or temporary?	☐ Change is permanent	
	☐ Change is temporary	Fill in section on MOC concerning duration of change.
Is the change necessary, consistent with company policy, and an acceptable course of action?	☐ Yes	Change should be forwarded for preliminary engineering.
	☐ No	Change should not be implemented.

SECTION 3: DURATION OF CHANGE

If the change is temporary, note duration here: _____

The table below should be used to track temporary changes.

SCHEDULE FOR TEMPORARY CHANGES

	Initiation Date	Expiration Date	Authorization
Initial request			
Extension #1			
Extension #2			
Extension #3			
Extension #4			
Extension #5			

SECTION 4: Updating Process Safety Information, Procedures, and Documentation

Identify the process safety information that needs to be revised because of this change

- ☐ Ammonia Inventory
- ☐ Ventilation system design / calculation
- ☐ Process flow diagrams
- ☐ Electrical one-line drawings
- ☐ Manufacturer IOM manuals
- ☐ Ammonia equipment lists
- ☐ Standard operating procedures
- ☐ Operator training procedures
- ☐ Hazard assessment
- ☐ Relief system design / calculation
- ☐ Codes and standards for the equipment
- ☐ Piping and instrumentation diagrams
- ☐ Fire water and sewer system drawings
- ☐ Criteria for design and operation
- ☐ Ammonia instrumentation lists
- ☐ PM procedures or schedule
- ☐ Emergency response procedures
- ☐ Safe work practices (describe): _____

_____

- ☐ Other (describe): _____

_____

_____

SECTION 5: Preliminary Engineering

Preliminary design reviewed by:_____ Date: _____

List any design recommendations (if applicable):

SECTION 6: Safety and Health Review

Safety review checklist reviewed by**:** _____ Date:_____

Item	Yes / No / N/A	Remarks / Comments	Recommendations
Safety			
1. Require new safety equipment or PPE?			
2. Require consideration of operator interface (i.e. ergonomics)?			
5. Require the need for LOTO devices or special setup to allow for maintenance?			
6. Adding new or different chemical to the area?			
Controls			
7. Bypass any existing control interlock or safety feature? If so, describe what has been provided to preserve the same level of protection.			
8. Are the existing indications and alarms adequate?			
9. Require change to detectors (location, addition), PLC controls, control logic?			
10. Require control of data access (password protection)?			

Item	Yes / No / N/A	Remarks / Comments	Recommendations
11. Require different computer control systems to interact w/ each other causing a compatibility issue?			
Chemistry			
12. Involve a chemical reaction (incompatibility of chemicals)?			
13. Create adverse conditions due to over or under addition of chemical to the process?			
14. Create the potential to add the wrong chemical to the process?			
Process			
15. Does the modification require that the on-site inventory of covered chemical be increased?			
16. Is electrical power and other services (e.g. cooling water) adequate to meet the demands?			
17. Increase or decrease the pressure and/or temperature of the system and/or component?			
18. Require a review or calculation of relief system (Bulletin #105), vent location and discharge?			
Maintenance / Construction			
19. Meet the codes and standards to which the equipment or process has been designed / installed?			
20. Meet the requirements of ANSI/IIAR-2-XXXX?			
21. Require pressure leak testing or welding certification on welds?			

Item	Yes / No / N/A	Remarks / Comments	Recommendations
22. Require labeling or field ID of piping, equipment, valves?			
23. Created any additional vulnerabilities which did not exist before (vehicle traffic, fire, water accumulation, high wind, etc.)?			
Environmental			
24. Impacts air emissions? Emission control equipment?			
25. Impacts wastewater? Change in volume or type of discharge?			
26. Impacts hazmat handling? Change to quantity, or storage? New waste material?			
27. Impacts to spill prevention (SPCC)?			
Quality			
28. Require new testing equipment?			
29. Requires sampling / testing to be performed?			
30. If sampling, is a sample port available?			
31. Requires new sanitation practice / equipment?			
32. Required addition to GMP program?			
33. Requires change to the HACCP program?			

SECTION 7: Process Hazard Analysis (if analysis is performed)

Date Hazard Analysis completed: _____

Does the Process Hazards Analysis address the impact of change on safety and health?

(Check One) ☐ Yes ☐ No

Final Hazard analysis report reviewed by:_____ Date:_____

SECTION 8: Start-up Authorization

Prior to start-up after this process change, a Prestart-up Safety Review must be completed and filed with this management of change.

Noyo Harbor District
Contractor Orientation Program

The following policies and procedures are applicable to all contract company employees and all subcontractors performing work at the Noyo Harbor District facility located in Fort Bragg. The purpose of these guidelines is to provide all contractors, subcontractors and their employees (collectively referred to as “contractors”) with a reference for some of the safety-related issues that may be encountered while working on-site. During the course of employment, contractors may be required to work under different kinds of conditions. It is the responsibility of the contractor foreman and each contractor employee to ensure that all contractor employees are provided a safe work area. Safety and regulatory compliance are each person’s individual responsibility. These guidelines do not, and are not intended to, address every requirement placed upon a company by federal, state, or local safety, health, or environmental regulation. The Noyo Harbor District expects contractors, their employees and subcontractors to be knowledgeable regarding, and comply with, all applicable safety, health, and environmental regulations, including Cal/OSHA and EPA rules.

Parking, signing In/Out Log and Security: Contractor parking is provided. The Noyo Harbor District does not require contractors to sign in or sign out daily.

Safety Meetings: For construction related projects, contractors are to conduct weekly meetings to discuss safety-related issues in the work area. Each contractor employee is required to attend and sign an attendance sheet. Subcontractors’ employees must hold their own weekly meetings and sign attendance sheets or attend the contractor’s meetings. The Noyo Harbor District project manager or representative must be notified of the meetings and invited to attend. Copies of the meeting minutes must be forwarded to the Noyo Harbor District project manager.

Inspections: For all construction related projects, contractors are required to conduct and document weekly inspections of their work and storage areas. Copies of these inspections along with documentation of corrective action must be provided to the Noyo Harbor District construction or project manager. In addition, contractors shall provide copies of any inspections conducted by outside agencies to the Noyo Harbor District construction or project manager. The project manager must be invited to participate in all inspections conducted by outside agencies.

First Aid and Medical Attention: All injuries must be immediately reported to the contractor’s foreman or supervisor, who must then notify the Noyo Harbor District project manager as soon as possible. 9-911 must be called depending on severity.

Contractors must investigate any incident resulting in medical treatment within 24 hours of the incident and provide a copy of their first report of injury and accident investigation report to the Noyo Harbor District project manager within this 24-hour period. Any incident resulting in the loss of blood or other potentially infectious material must be addressed by a trained contractor employee or representative. Do not attempt to clean-up any blood or other bodily fluids unless you have received specific Bloodborne Pathogen training and have been designated to perform this type of work.

Emergency Evacuation: In the event that the facility needs to be evacuated for any reason, you will be notified via **Fire Alarm.** Follow the directions provided by your foreman or supervisor in exiting the building. All contractor employees must assemble at **the Assembly Area (Thanksgiving Coffee Company)** following an evacuation. Foremen and supervisors are responsible for accounting for all their employees and immediately reporting this information to their NHD representative. If there is a need for evacuating a section of the facility, your foreman or supervisor will direct you.

Good Manufacturing Practices (GMP): Due to the manufacturing and/or distribution of food products, these guidelines must be strictly followed to prevent any potential contamination.

A. No person who is affected with, has been exposed to, or is a carrier of a communicable disease, or who has boils, open sores, infected wounds, or other potential sources of micro-biological contamination will work in any area in which there is a reasonable possibility that (i) food or food ingredients can be contaminated, or (ii) disease can be transmitted from that person to other individuals. The NHD Harbormaster will make the final decision in all questionable instances.
B. Facial hair is not permitted, except that a neat mustache, beard, or sideburns are permissible if a beard net is worn that completely covers the beard.
C. Hair must be neatly groomed. A hair net must be worn to cover and contain the hair as completely as possible. This includes covering the ears.
D. No jewelry will be permitted on persons working within the plant. Shirt and jacket pockets must be kept empty, with all objects such as pens, pencils, notebooks, tools, etc. carried below the waistline.
E. Smoking is not allowed near the work site.
F. Suitable clothing will be worn at all times. Shirts that cover the shoulders and upper torso are required. No “muscle” shirts are allowed. Long pants are required. Shorts are not allowed.
G. Bandages and Band-Aids® are not permitted in the food processing areas unless covered with special tape, or gloves. These must be approved by the Quality Manager.

H. No candy, gum, food, or drinks will be allowed to be consumed, stored, or disposed of within this facility except in designated areas, such as a cafeteria or break room.

Elevated Work and Fall Protection: Use ladders or stairs for access. Straight or extension ladders must be held by another employee, tied-off, or secured at the top in some other acceptable manner. Such ladders must extend at least 3 feet above the upper support. A safety harness with lanyard or other means of fall arrest device must be used when workers are exposed to a potential fall of six (6) feet or more. Tie off must be made to an object that will sustain 5,000 lbs. of force per person. When working within 6 feet of a roof edge or unprotected opening, you must be tied off, unless guardrails/midrails and toeboards or other means of fall protection/arrest are present. If guardrails are not present, warning lines must be established 6 feet from the roof edge. If performing an operation that may pose a hazard from falling objects, contractors must take appropriate action to protect individuals working below. Parapetted roofs must meet the 42-inch railing requirement to be considered adequate fall protection. Wood ladders may not be used in the facility.

Aerial Platforms: Only trained, authorized personnel may operate an aerial lift. A body harness and lanyard attached to the boom or basket is required when in the basket. Scissor lifts do not require harness and lanyard fall protection as long as all employees are protected by the standard railing and all chains are properly secured. A pre-use aerial work platform inspection checklist must be completed before using an aerial lift.

Scaffolds: All OSHA standards for scaffolds must be followed. Standard railings must be installed for platforms over six (6) feet.

Hot Work Operations: During welding, cutting burning or grinding it is necessary to obtain a hot work permit before any such work can be done. It is a requirement to monitor the work area 30 minutes after the hot work is completed. This helps to limit any potential fire hazards. A fire watch is required during all hot work, including breaks and lunch. All permits must be placed in a visible and easily accessible area. All permits must be turned in to the NHD construction or project manager after each shift. A fully operable fire extinguisher, supplied by the contractor or NHD, must be within 35 feet of any hot work area. Plant fire extinguishers can not be used to meet this requirement. Welding screens must be used when welding in aisles / doorways or other areas where employees may be exposed to a flash. Compressed gas cylinders must be stored in accordance with OSHA standards. Propane must not be stored inside any building. The NHD construction or project manager must be consulted for the storage of any flammable material. All OSHA requirements for storage of flammable materials must be followed.

Ground Fault Protection: All extension cords, power tools, and outlets need to be Ground Fault Circuit Interruption (GFCI) protected and/or part of an Assured Grounding Program. If an Assured Grounding Program is used, a copy of the program and all inspections must be furnished to the NHD construction or project manager.

ARC Flash Protection: ARC Flash requirements under NFPA 70 rules apply and must be followed by all contract employees.

Use of NHD Owned Equipment: NHD owned tools and equipment may not be used by contractors, unless approved by the Harbormaster.

Power Tools: If tools are damaged or defective, they must be taken out of service immediately. All National Electric Codes must be followed.

Personal Protective Equipment: For construction projects, hard hats and safety-toed shoes/boots must always be worn. Face shields and safety glasses must be used when grinding, performing overhead drilling or any other jobs which may pose a hazard to the face. Respirators are to be worn if required. Hearing protection is required in all production areas of the facility.

Housekeeping/Waste Disposal/Spills: Contractors are responsible for keeping their work area orderly and clean. It is the sole responsibility of Contractors to properly handle and dispose of any and all hazardous materials generated by their work in compliance with all applicable federal, state or local regulations.

Powered Industrial Trucks: All operators must be properly trained and authorized to operate a forklift or other powered industrial trucks. All operators must have been certified within the prior three years. Certification documents must be available for review by the NHD project manager or representative.

Cranes and Rigging: Only qualified operators/riggers will perform rigging. All cranes must be inspected, and daily crane inspection reports must be filled out and copies turned into the NHD construction or project manager. In addition, lift off sheets must be filled out for every lift over 2000 lbs. and copies turned in to the construction or project manager. For all lifts over 1200 lbs., the area directly under the path of the lift must first be evacuated.

Confined Spaces: Confined Space Permits must be completed before entry into any space designated as a permit-required confined space. All existing spaces are identified as such. The contractor is responsible to identify any new spaces that are created during the project. Contractors are responsible to ensure appropriate rescue

services are available and coordinated with the location. A pre-entry meeting shall take place between the contractor and the project manager prior to entry.

Lockout/Tagout: Equipment must be locked out and tagged before any employee performs any servicing or maintenance activities. Contractors must ensure that each employee involved in the lockout procedure is trained as an authorized employee under the OSHA lockout standard.

Hazard Communication: Contractors must maintain a copy of all safety data sheets (SDS's) on-site for all chemical materials brought on-site. Copies of SDS's for all NHD owned materials can be obtained from the on-site NHD Safety representative. All chemical containers must be properly labeled as to contents and hazards.

Chemical Management: If any chemicals are released or spilled, the contractor is responsible for taking immediate steps to stop or mitigate the release (e.g. drain blocks, absorbent pigs) clean it up and notify Safety Manager. In addition, the contractor must provide notification of chemical releases to government agencies as required by applicable law and regulation. Contractors must prevent potential or actual contamination of stormwater in the conducted of their activities. Contractors are responsible for storing all waste materials they generate in compliance with applicable law and regulation, including universal wastes and other hazardous wastes, used oils and non-hazardous solid wastes. Any such waste materials shall be removed from the premises by the contractor prior to, or immediately following, the completion of work by the contractor.

Ammonia: This facility utilizes ammonia for its refrigeration process. Anhydrous ammonia is a liquid under storage pressure. The gas is colorless with an extremely pungent odor that can be very hazardous and corrosive if released. Eyes and respiratory track are particularly vulnerable. Contact lenses shall not be worn when servicing equipment or at any time in the Engine Room. If there is any smell or other indication that ammonia has been released, evacuate the area immediately and then notify the NHD project manager or representative. Prior to cutting into any line or pipe, the contractor must obtain a permit from the plant PSM coordinator.

Asbestos: This facility may contain asbestos or materials suspected to contain asbestos. You will be notified by your supervisor of any materials containing, or suspected to contain, asbestos in the affected work area. If there are any questions concerning these materials, contact the NHD project manager or representative prior to conducting any work on, or involving, these materials.

Excavation/Trenching: Prior to digging, an excavation permit must be completed by a competent person and posted at the job site. All utilities must be located prior to excavation. All OSHA requirements for trench access and shoring must be followed.

Conduct: Horseplay, running, gambling, fighting, weapons, camera equipment or anyone under the influence of any illegal substances or alcohol are not permitted on property. All violations must be immediately reported to the project or construction manager.

EMPLOYEE CERTIFICATION STATEMENT / TRAINING RECORD

Company: _____ Date: _____

Address: _____

Subject: Certification Statement of Employee Competency

Type of Training (circle one): Initial / Refresher

Employee/Contractor Name:_____

Employee/Contractor Title:_____

Employee/Contractor Job Description, Responsibilities, and Duties:

_____

_____

Description of Training Conducted; if SOP Training, List Specific SOP's (if necessary, attach list of SOPs or additional training overview / agenda to this page):

_____

_____

_____

_____

Type of competency testing used (check all that applies):

Written _____ Verbal_____ Observance _____ Demonstrative _____

Other _____ (describe) _____

****

The purpose of this letter is to certify that the above-mentioned employee/contractor has the required knowledge, skills, and abilities to safely carry out the duties and responsibilities as provided above and in conjunction with the operating procedures.

Signature of Employee/ Contractor:	_____	Signature of Supervisor:	_____
Name:	_____	Name:	_____
Company:	_____	Company:	_____

NOYO HARBOR DISTRICT
CALIFORNIA ACCIDENTAL RELEASE PREVENTION (CALARP)
& RISK MANAGEMENT PROGRAM (RMP)

FOR THE COVERED PROCESS LOCATED AT:
19101 S. Harbor Drive
Fort Bragg, CA 95437

RMP PREPARER:
Applied Process Cooling Corporation (APCCO)
4812 Enterprise way
Modesto, CA 95356

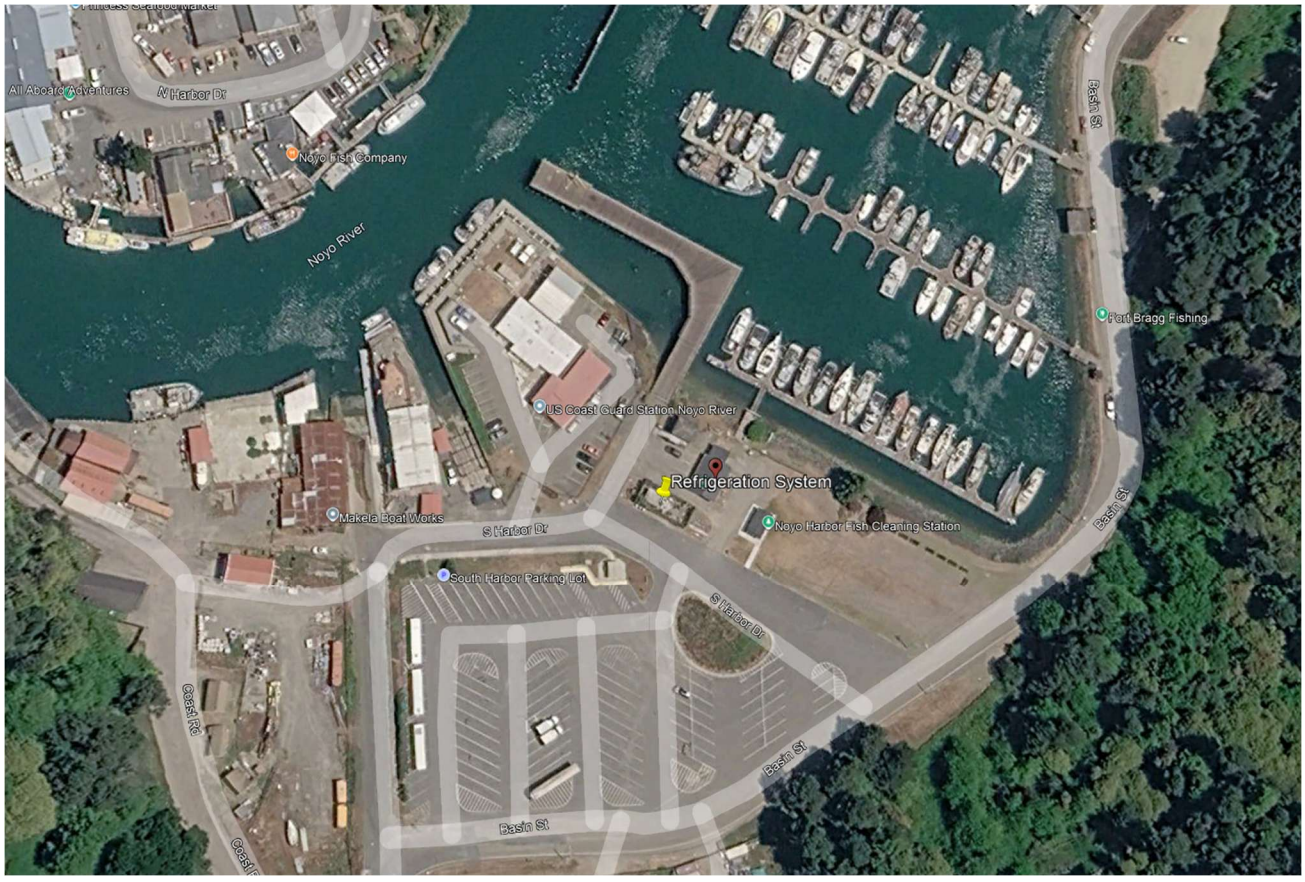
Table of Contents

NOYO HARBOR DISTRICT

I. GENERAL (40 CFR 68: SUBPART A / 19 CCR CALARP: ARTICLE 1)

A. LOCATION OF THE STATIONARY SOURCE

Noyo Harbor District is in Fort Bragg, California. The facility sits in Noyo Harbor. The facility is situated in a working harbor environment, with surrounding land uses predominantly dedicated to commercial fishing, seafood processing, and related maritime support activities. It is zoned as industrial use only.



B. APPLICABILITY (19 CCR 5050.4)

Program Level 2 covers processes that do not meet the Program Level 1 requirements and typically have less complex processes than Program Level 3 requirements. Retail facilities, small to medium manufacturing facilities, and some publicly owned drinking water or wastewater treatment plants may be examples of Program Level 2 processes.

Program 2 eligibility requirements. A covered process is subject to Program 2 requirements if it does not meet the eligibility requirements of either section (c) or (e).

Pursuant to Section 5050.4, the program level for the covered process has been established based on consideration of process complexity, the Noyo Harbor District accident history, and the potential offsite impact associated with a release of the regulated substance.

At the request of the Mendocino County UPA, and in the interest of providing an enhanced level of public safety, the Noyo Harbor District has agreed to develop and implement a **Program Level 3 prevention program** for the covered process.

While the facility does not otherwise meet the standard criteria for Program Level 3 applicability, the prevention program elements consistent with Program Level 3 requirements will be implemented and maintained at the facility. The Risk Management Plan (RMP) will continue to be maintained in accordance with applicable state requirements; however, submittal through the federal CDX system is not applicable to this facility.

C. APPLICABILITY (40 CFR 68.10)

Noyo Harbor District shall comply with the public meeting requirement in §68.210(b) within 90 days of any RMP reportable accident with known offsite impacts specified in § 68.42(a), that occurs after March 15, 2021.

After December 19, 2024, for any risk management plan submitted as an update required by §68.190, the owner or operator shall comply with the following risk management plan provisions of subpart G of this part:

- Reporting a public meeting after an RMP reportable accident under §68.160(b)(21)
- Reporting emergency response program information under §68.180(a)(1)
- Reporting emergency response program information under § 68.180(a)(2) and (3), as applicable; and,
- Reporting emergency response program and exercises information under §68.180(b), as applicable Noyo Harbor District shall submit dates of the most recent notification, field and tabletop exercises in the risk management plan, for exercises completed as required under §68.96 at the time the risk management plan is either submitted under §68.150(b)(2) or (3), or is updated under §68.190.

By May 10, 2027, Noyo Harbor District shall comply with the following provisions promulgated on May 10, 2024:

- Standby or backup power for continuous operation of monitoring equipment associated with prevention and detection of accidental releases from covered processes in §68.67(c)(3);
- Third-party audit provisions in §68.79(f) through (h), and 68.80;
- Incident investigation root cause analysis provisions in §68.81(h);
- Employee participation provisions in §68.83;
- Emergency response provisions in §68.90(b) and 68.95(a); and
- Availability of information provisions in §68.210(d) through (h).

By May 10, 2028, Noyo Harbor District shall comply with the risk management plan provisions of subpart G of this part.

D. GENERAL REQUIREMENTS (40 CFR 68.12 / 19 CCR 5050.5)

Noyo Harbor District shall closely coordinate with the UPA to implement the requirements of CalARP and to determine the appropriate level of documentation required.

Noyo Harbor District is subject to the CalARP regulations and shall submit an RMP to Mendocino County UPA. The CalARP program requires the following components:

- Management system
- Offsite consequence analysis (Hazard Assessment)
- Accident prevention program
- Coordinate and develop an Emergency Response Program and conduct exercises
- Submit data on the prevention program element for Program 3

E. MANAGEMENT SYSTEM (40 CFR 68.15 / 19 CCR 5050.6)

To oversee the implementation of the RMP, Noyo Harbor District has assigned a qualified person or position with overall responsibility for the development, implementation, and integration of the RMP. If responsibilities are shared among individuals, the names or positions of these people shall be documented, and the lines of authority defined by an organization chart or similar document.

Anna Neumann, Harbormaster is responsible for the coordination and managerial oversight of the CalARP Program elements associated with management of the ammonia refrigeration system. The chart below shows the responsible individual for each prevention program section along with the responsibilities outlined within the prevention program regulations.

If additional employees are hired by Noyo Harbor District, the management system can be represented through an organizational chart. A refrigeration contractor and/or a consultant assists with compliance.

PROGRAM ELEMENT	RESPONSIBLE PERSON / TITLE	RESPONSIBLE UNDER THE PROGRAM
Risk Management Program (RMP)	Harbormaster	Ensures program elements are in place, in use, and effective Ensures that an initial hazard assessment is conducted for all covered processes Ensures that the hazard assessment is reviewed and updated at least every five (5) years Ensures that the hazard assessment is updated if a change impacts the distance to the toxic endpoint by a factor of two (2) in any direction Ensures that the hazard assessment is updated if an incident results in off-site consequences or is of a reportable quantity
Process Safety Information*	Harbormaster	Ensures the safety information is prepared and maintained Ensures that the information is updated when a change is made to any covered process
Process Hazard Review*	Harbormaster with assistance from consultant	Ensure that hazard reviews are performed per the written guidelines Ensures that all recommendations identified during the analysis are resolved within 2.5 years within an agreed upon timeline with UPA Ensures that the hazard review is revalidated every 5-years Ensures that a process hazard analysis is conducted when a major change is made to any covered process

PROGRAM ELEMENT	RESPONSIBLE PERSON / TITLE	RESPONSIBLE UNDER THE PROGRAM
Operating Procedures	Harbormaster, Marina Manager with assistance from refrigeration contractor	Ensures that written operating procedures are developed and maintained for all covered processes Ensures the procedures are reviewed on an annual basis to ensure they are accurate and current Ensures that the procedures are updated when a change is made to the covered process
Training	Marina Manager with assistance from refrigeration contractor	Ensure that the personnel who operate and maintain the covered process are trained and qualified Sets frequency of refresher training (with employees) Ensure that new employees receive initial training Ensure refresher training is conducted at least every 3 years Ensures training is conducted when changes are made to the covered process
Mechanical Integrity*	Harbormaster, Marina Manager with assistance from refrigeration contractor	Identifies and lists the system and equipment, which are critical to the safety and reliability of the covered process Ensures that equipment files are maintained for each component listed in the equipment list Identifies the good engineering practices, which apply to the covered process Ensure that inspection and testing of critical process equipment is planned, scheduled, recorded, and managed according to good engineering practices

PROGRAM ELEMENT	RESPONSIBLE PERSON / TITLE	RESPONSIBLE UNDER THE PROGRAM
Mechanical Integrity, *cont.*		Establishes and implements procedures to ensure that efficiencies are dealt with in a timely and technically sound manner Establishes and implements quality assurance procedures for the mechanical integrity activities
Management of Change*	Harbormaster, Marina Manager with assistance from consultant	Reviews and classifies a modification as a “change” or a “replacement in kind” Classifies a change as “minor” or “major” and indicates whether it is permanent or temporary Coordinates/conducts health and safety reviews Ensures that recommendations identified during the health and safety review are evaluated and those which are accepted are implemented prior to start-up Ensures that the RMP program is updated as required
Pre-Startup Safety Review*	Harbormaster, Marina Manager with assistance from consultant	Ensures that pre-startup safety reviews are conducted to ensure that modifications are installed in accordance with approved design standards New procedures are developed prior to start-up of a modified facility or that existing procedures are modified accordingly, and that all personnel are trained on the procedures
Compliance Audit	Harbormaster with assistance from consultant	Ensures that a compliance audit is conducted at least every three (3) years Ensures that all recommendations are resolved within one and one-half (1.5) years or the next planned turnaround; or agreed upon timeline with UPA

PROGRAM ELEMENT	RESPONSIBLE PERSON / TITLE	RESPONSIBLE UNDER THE PROGRAM
Compliance Audit, *cont.*		Ensures recommendations document the actual completion date when deficiency was corrected
Incident Investigation	Harbormaster with assistance from investigation team	Determines whether an incident requires investigation and establishes the team leader / team membership Ensures that all recommendations identified during the investigation are resolved within one and one-half (1.5) years after the completion of the incident investigation, or two (2) years after the date of the incident, whichever is the earlier of the two dates, or agreed upon timeline with UPA
Employee Participation	Harbormaster	Ensures that employees are involved in establishing and implementing the RMP Ensures that every employee is given an overview of the RMP during their new employee orientation Ensure that employees receive regular updates on the RMP Ensures that all employees have complete access to the RMP
Hot Work Permit*	Harbormaster & Marina Manager	Ensure that the hot work procedures are followed at the facility
Contractor*	Harbormaster & Marina Manager	Identifies contractors who are covered by these procedures Evaluate contractors and prepare an approved contractors list Participates in job planning meetings with contractors Periodically audits the performance of the contractors Ensure that only contractors that have been evaluated may perform work on any covered process

PROGRAM ELEMENT	RESPONSIBLE PERSON / TITLE	RESPONSIBLE UNDER THE PROGRAM
Emergency Action Plan	Harbormaster	Responsible for the development and implementation of the emergency action plan Ensures that the plan is coordinated with the appropriate agencies such as: UPA, LEPC, local responders, etc. Ensures that the plan is reviewed and updated at least on an annual basis Ensures that the training and drills are conducted at least on an annual basis

*** Program 3 requirement that has been implemented**

II. REGISTRATION (40 CFR 68: Subpart G / 19 CCR CalARP: Articles 2 & 3)

A. SUBMISSION AND REGISTRATION (40 CFR 68.150 & 68.160 / 19 CCR 5060.1 & 5070.1)

EPA and CalARP regulations require a copy of the RMP to be submitted to Mendocino County UPA.

5060.1(d)(1)	Facility / stationary source name	Noyo Harbor District
	Street	19101 S. Harbor Drive
	City	Fort Bragg
	County	Mendocino
	State	California
	Zip Code	95437
	Latitude and longitude	39.422939 / -123.80215
	Method for obtaining latitude and longitude	GO – GPS Unspecified
	Description of location that latitude and longitude represent	Vessel location

5060.1(d)(2)	Dun & Bradstreet number	020011250
5060.1(d)(3)	Dun & Bradstreet number of the corporate parent company	N/A
5060.1(d)(4)	Name of facility owner or operator	Noyo Harbor District
	Telephone number of the owner or operator	707-964-4719
	Mailing address of the owner or operator	19101 S. Harbor Drive, Fort Bragg, CA 95437
5060.1(d)(5)	Name and title of the person or position with the overall responsibility for RMP elements and implementation	Anna Neumann, Harbormaster
	Email address for that person or position (optional)	harbormaster@ noyoharbordistrict.org
5060.1(d)(6)	Name of emergency contact	Anna Neumann
	Title of emergency contact	Harbormaster
	Telephone number of the emergency contact	707-964-4719
	24-hour telephone number of the emergency contact	707-964-4719
	Email address for the emergency contact	harbormaster@ noyoharbordistrict.org
5060.1(d)(7)	List of covered process(es)	Ammonia Refrigeration System
	Name(s) of regulated substances	Anhydrous Ammonia
	Chemical Abstracts Service (CAS) number(s) of regulated substances	7664-41-7
	Maximum quantity of regulated substances (in pounds to two significant digits)	600 (after first charge)
	North American Industry Classification System (NAICS) code that most closely corresponds to the process	488310 - Port and Harbor Operations
	Program level of each process	2 (Agreed to Program 3)
5060.1(d)(8)	The stationary source USEPA identifier	N/A

5060.1(d)(9)	The number of full-time employees at the stationary source	3
5060.1(d)(10)	Is the stationary source subject to Section 5189 of Title 8 of CCR?	No
5060.1(d)(11)	Is the stationary source subject to Part 355 of Title 40 of CFR?	Yes
5060.1(d)(12)	Does the stationary source have a CAA Title V operating permit?	No
	Is so, list the permit number	
5060.1d)(13)	The date of the last safety inspection of the stationary source by a federal, state, or local government agency	None
	Name of the inspection entity	
5060.1(d)(14)	The name of the contractor who prepared the RMP (if any)	Applied Process Cooling Corporation (APCCO)
	Mailing address of the contractor	4812 Enterprise Way, Modesto, CA 95356
	Telephone number of the contractor	209-578-1000
5060.1(d)(15)	Source or parent company e-mail address (optional)	harbormaster@ noyoharbordistrict.org
5060.1(d)(16)	Source homepage address (optional)	Noyoharbordistrict.org
5060.1(d)(17)	Phone number at the source for public inquiries (optional)	707-964-4719
5060.1(d)(18)	Local Emergency Planning Committee (optional)	Coastal LEPC Region II
5060.1(d)(19)	OSHA Voluntary Protection Program status (optional)	
5060.1(d)(20)	The type and reason for any changes being made to previously submitted RMP. The types of changes to the RMP are categorized as follows:	N/A - Initial
	Updates and re-submissions required under CCR, Section 5070.11(a) or (b)	

	Corrections under Sections 5070.12 or for purposes of correcting minor clerical errors, updating administrative information, providing missing data elements, or reflecting facility ownership changes, and which do not require an update and re-submission	
	De-registration	
	Withdrawals of an RMP for any facility that was erroneously considered subject to the CalARP Program	

III. RISK MANAGEMENT PLAN (40 CFR 68: Subparts G / 19 CCR CalARP: Articles 2 & 3)

A. RMP REVIEW PROCESS (19 CCR 5070.2)

The RMP shall be certified complete by a qualified person and shall be submitted to Mendocino County UPA. Completeness shall be determined in accordance with Sections 5070.3 through 5070.10. Noyo Harbor District shall work closely with the UPA to determine that the RMP contains an appropriate level of detail.

Mendocino County UPA shall review the RMP to determine if all the elements are contained in the document and provide a written notice to Noyo Harbor District of any deficiencies. The Mendocino County UPA may authorize the air pollution control district (APCD) or air quality management district (AQMD) to conduct a technical review of the RMP.

Noyo Harbor District shall have 60 calendar days from receipt of the notification of RMP deficiencies to make any corrections. A request, in writing, a one-time 30 calendar day extension to correct deficiencies. At the end of the 60 calendar days, and any extension period if applicable, they shall resubmit the corrected, revised RMP to the Mendocino County UPA. Failure to correct deficiencies during the specified time frame shall subject them to the penalties specified in Sections 25540 and 25541 of HSC.

If no deficiencies are identified, Mendocino County UPA shall accept the RMP as complete and submit the RMP for formal public review. Within 15 calendar days after the Mendocino

County UPA determines that the RMP is complete, they shall make the RMP available to the public for review and comment by publishing a notice in a local newspaper of general circulation, or on their website. The notice shall describe the RMP and state a location where it may be reviewed. The Mendocino County UPA shall directly notify individuals and organizations who have specifically requested to be notified. The public shall have 45 calendar days to comment following the publication date of the notice. They shall review all public comments.

The evaluation review shall be conducted by the Mendocino County UPA at the end of the formal public review period. They shall take the public comments into consideration during the evaluation review. They shall consider standard application of engineering and scientific principles, site specific characteristics, technical accuracy, severity of offsite consequences, and other information in the possession of or reviewed by the UPA. The evaluation review may include inspections and an onsite document review of records and data which may not be in their possession.

The evaluation review shall be completed by Mendocino County UPA as follows:

- For an RMP which includes a Program 3 process, the evaluation review shall be completed within 24 months.
- The evaluation review does not include time for corrections of deficiencies

B. EXECUTIVE SUMMARY (40 CFR 68.155 / 19 CCR 5070.3)

Noyo Harbor District has prepared this Risk Management Program in accordance with the California Accidental Release Prevention (CalARP) regulations and applicable portions of the federal Risk Management Program rule. The facility handles regulated substances above applicable threshold quantities and is subject to Program 2 requirements based on process applicability.

At the direction of the County, the facility is implementing Program 3 prevention program elements. As a result, this Risk Management Plan reflects the development and incorporation of Program 3 components to enhance hazard evaluation, documentation, and overall program structure.

The purpose of this Risk Management Program is to identify regulated substances at the facility, evaluate potential accidental release scenarios, and describe the prevention and emergency response measures in place to reduce the likelihood and consequences of a release. An RMP / CalARP program shall be submitted to Mendocino County UPA. The following areas are addressed in this summary:

1. Accidental release prevention and emergency response policies at the stationary source

2. The stationary source and regulated substances handled
3. The accidental release prevention program and chemical-specific prevention steps
4. The five-year accident history
5. The emergency response program
6. Planned changes to improve safety

Noyo Harbor District recognizes that the RMP is a continuous process for evaluating, monitoring, and improving anhydrous ammonia handling operations at its facility. As such, this document and related attachments and program elements will evolve as Noyo Harbor District continues their ongoing focus and dedication of risk minimization and safety improvement for their employees and surrounding community. Noyo Harbor District will submit revised information if a change occurs that is considered significant and requires resubmission under the regulations. However, minor improvements / modifications to the prevention program, related attachments, and program elements will be incorporated consistently with Noyo Harbor District 's internal review practices, and Noyo Harbor District will maintain the most current versions onsite. Thus, the most current version and related documents and elements maintained onsite may vary slightly from the information in submittals made to Mendocino County UPA.

B-1 ACCIDENTAL RELEASE PREVENTION AND EMERGENCY RESPONSE POLICIES

Noyo Harbor District is committed to preventing accidental releases of ammonia and to responding effectively should a release occur. Accidental release prevention is achieved through the implementation of appropriate operating practices, employee training, routine inspection and maintenance activities, and adherence to recognized industry practices applicable to the refrigeration system.

Emergency response policies are designed to protect facility personnel, the public, and the environment by ensuring timely recognition of abnormal conditions, prompt notification, and appropriate response actions. Facility personnel will be trained to follow established procedures during emergency situations, including evacuation, isolation of affected areas when safe to do so, and coordination with local emergency responders as appropriate.
These prevention and response policies are reviewed periodically and updated as necessary to reflect changes in facility operations, equipment, or regulatory requirements.

B-2 STATIONARY SOURCE ACTIVITIES AND REGULATED SUBSTANCES HANDLED

Noyo Harbor District operates an ice manufacturing unit that utilizes an ammonia refrigeration system to support its operations. Office hours are from 8 AM – 5 PM and during the weekend,

maintenance personnel are onsite from 7:30 AM – 3 PM. During the weekday office hours, the public can request ice. During the weekend, appointments shall be made for ice distribution.

Anhydrous ammonia is the only regulated substance handled at the facility. The total ammonia inventory exceeds the California Accidental Release Prevention (CalARP) threshold of 500 pounds, which places the facility under Program 2 requirements of the CalARP regulations, while remaining below the federal threshold of 10,000 pounds. However, Mendocino County UPA has requested the facility implement Program 3 requirements.

B-3 ACCIDENTAL RELEASE PREVENTION PROGRAM

To minimize the potential for accidental releases, Noyo Harbor District has implemented a comprehensive prevention program consistent with the elements required under RMP / CalARP regulations. Key components include:

- **Process Safety Information:**
  The facility maintains process safety information for the refrigeration system to support safe operation, maintenance, and response activities. This information includes equipment descriptions, manufacturer documentation, and general system information necessary for facility personnel and contractors. Process safety information is maintained in an accessible format and is reviewed and updated, as needed, to reflect changes to the system and current operating practices.
- **Process Hazard Analysis:**
  A hazard review has been conducted to identify potential release scenarios and evaluate the safeguards associated with the refrigeration system. Recommendations are reviewed by management and addressed based on priority and overall risk to the system. The facility continues to track and resolve identified items as part of its ongoing program management.
- **Operating Procedures:**
  Operation and maintenance of the refrigeration system are carried out using established operating practices and applicable manufacturer guidance. The facility is in the process of formalizing written operating procedures to document normal operation, shutdown, and key response actions. Manufacturer (OEM) documentation is used as a reference, where applicable. Procedures will be reviewed and certified on an annual basis to ensure they remain consistent with current system configuration and operating practices.
- **Training:**
  Facility personnel involved in operating or maintaining the refrigeration system receive training appropriate to their job responsibilities. Training includes an overview of ammonia

hazards, system operation, emergency procedures, and safe work practices. Refresher training is provided as needed to reinforce knowledge and ensure continued understanding. Where practicable, training incorporates hands-on experience to support effective task execution.

- **Mechanical Integrity:**
  Routine inspection, testing and maintenance is performed to support the safe and reliable operation of the refrigeration system. These activities are conducted in accordance with established maintenance practices, applicable manufacturer recommendations, and recognized and generally accepted good engineering practices (RAGAGEP).

  The facility has implemented a mechanical integrity approach that includes inspection and testing of critical equipment, routine maintenance activities, and documentation of work performed. Qualified refrigeration contractors are utilized to perform specialized maintenance and to support the facility in responding to abnormal operating conditions and emergency maintenance needs.

  Facility personnel and contractors follow established work practices and procedures to ensure activities are conducted in a consistent and controlled manner.

- **Management of Change:**
  The facility utilizes a Management of Change (MOC) process to evaluate and document changes to the refrigeration system, including modifications to equipment, procedures, materials, or operating conditions. Changes are reviewed prior to implementation to identify potential impacts to safety, operations, and maintenance. The process includes documentation of the change, applicable reviews, and communication to affected personnel.

- **Pre-Startup Safety Review:**
  Pre-startup safety reviews are conducted for new installations and significant modifications to the refrigeration system to confirm that construction and equipment are consistent with design specifications and that applicable safety, operating, and maintenance requirements have been addressed prior to startup. The review includes verification that procedures, training, and safety systems are in place before the system is placed into service.

- **Compliance Audit:**
  A comprehensive compliance audit is conducted at least every three years to evaluate the effectiveness of the prevention program. Deficiencies identified during the audit are promptly corrected and documented.

- **Incident Investigation:**

All incidents that resulted in or could reasonably have resulted in a catastrophic release are investigated. The root cause is identified, and corrective actions are developed, implemented, and communicated to affected personnel.

- **Employee Participation:**
  The facility provides opportunities for employees to participate in the development and ongoing implementation of the prevention program. Personnel are involved in activities such as hazard reviews, training, and discussions related to system operation and safety practices. Relevant program information is made available to employees to support their understanding of the refrigeration system and associated hazards.
- **Hot Work Permit:**
  The facility implements a hot work permitting process to control activities involving open flames or spark-producing equipment conducted in or near the refrigeration system. The permit process requires evaluation of the work area, identification of potential hazards, and implementation of appropriate safeguards prior to starting work. Permits are completed and maintained in accordance with facility practices to ensure hot work activities are conducted safely.
- **Contractors:**
  The facility utilizes qualified contractors to perform specialized work on the refrigeration system. Contractors are expected to have appropriate training and experience and are informed of the hazards associated with the system. The facility communicates applicable safety requirements and expectations to contractors prior to the start of work and coordinates activities to ensure work is performed safely and in accordance with established practices.

B-4 FIVE YEAR ACCIDENT HISTORY

The CalARP regulations require a review of the 5-year accident history at the regulated facility. History must include "all accidental releases from covered processes that resulted in deaths, injuries, or significant property damage onsite, or known offsite deaths, injuries, evacuations, sheltering in place, property damage, or environmental damage."

Prior to this RMP submission, Noyo Harbor District has not maintained a covered process at this location. This is the initial RMP for Noyo Harbor District therefore there is no five-year accident history to report.

Any person who has knowledge or observes any release of hazardous material which he/she knows or reasonably suspects to be unauthorized shall report the known or suspected instance of unauthorized release to the Health Officer, (Mendocino County UPA) immediately or as soon as practically possible.

Noyo Harbor District will adhere to both requirements and report incidents as required.

B-5 EMERGENCY RESPONSE PROGRAM

Noyo Harbor District maintains a written Emergency Action Plan (EAP). The facility does not take any actions beyond evacuating the area. This plan is designed to ensure a prompt, coordinated, and effective response to accidental releases of regulated substances. Key features include:

- **Emergency Planning and Coordination:** Coordination with local emergency response agencies, including the local fire department and hazmat team, and other relevant authorities.
- **Notification Procedures:** Clearly defined procedures for immediate notification of appropriate emergency responders, the public (if necessary), and regulatory agencies in accordance with applicable release reporting requirements.
- **Response Procedures:** Guidance for personnel response actions, including evacuation and mitigation procedures.

Noyo Harbor District will rely on outside responders from the fire department for mitigation of releases. The EAP states that the Noyo Harbor District Emergency Coordinator will be in charge until such time as an outside responding agency assumes that role. Noyo Harbor District will oversee evacuation and remain in control until the Fire Department arrives, then Incident Command will be assumed by the senior Fire Department official at the scene. The Fire Department Incident Commander will be responsible for issuing notices for public evacuation and/or sheltering in place, if necessary, Noyo Harbor District will be responsible for making initial contact with the Fire Department via 9-1-1; Mendocino County UPA; Cal OES, federal NRC, and any other agencies that need to be contacted. Noyo Harbor District will rely on community responders for medical assistance as necessary. Responsibility for cleanup after the release is spelled out in the EAP. At a minimum, the plan should address the following

- Procedures for reporting a fire or other emergency
- Evacuation Procedures
- Procedures to be followed by employees who remain behind to operate critical plant operations
- Procedures to account for employees after evacuation
- Rescue and medical duties
- Name and job title of who to contact for questions

B-6 PLANNED CHANGES TO IMPROVE SAFETY

Protection of employees, the surrounding community, the environment, and product quality are primary considerations at this facility. An initial hazard review was conducted at Noyo

Harbor District in February 2026 to identify opportunities to further improve system safety and reliability. Recommendations resulting from the hazard review are being evaluated and addressed by facility management, with planned actions prioritized based on risk. Upon completion, the hazard review documentation will be submitted to the County for review, as required.

In addition to the engineering safeties that are inherent in a new system, the following recommendations were developed by the team that will bolster the safety of the refrigeration system. Some of the recommendations include the following:

- Improving documentation and accessibility of process safety information, including equipment specifications and system design details
- Enhancing operating practices through the development and formalization of written procedures
- Evaluating and strengthening inspection and maintenance activities for critical equipment to support mechanical integrity
- Verifying safety system functions and setpoints to ensure proper operation during abnormal conditions
- Improving emergency response preparedness, including clarification of roles, responsibilities, and communication protocols
- Enhancing training and awareness for personnel involved in operation and maintenance of the system

For the complete list of recommendations, estimated due dates and status, refer to the report and tracking log.

The timetable for completion of the recommendations is August 5, 2028. If Noyo Harbor District cannot meet this timeline, they shall notify Mendocino County prior to the deadline coming due, to come into an agreement on a schedule of completion. Please note that recommendation assignments, individual estimated completion dates, actual completion dates, etc. are tracked outside of this document, within the hazard review master tracking log.

C. FIVE-YEAR ACCIDENT HISTORY (40 CFR 68.168 / 19 CCR 5070.5)

This is an initial RMP submittal, so Noyo Harbor District has not experienced any significant accidents or accidental releases that are reportable. Reportable releases must have caused at least one of the following:

- On-site deaths, injuries, or significant property damage of $50,000 or more; or
- Known offsite deaths, injuries, property damage, environmental damage, evacuations, or sheltering in place.

As required by the CalARP Program regulations, all accidental releases of ammonia that result in deaths, injuries, or significant property damage on site, or result in known offsite deaths, injuries, evacuations, sheltering in place, property damage, or environmental damage, shall be documented, and made part of the facility Five-year Accident History.

D. PROGRAM 3 PREVENTION PROGRAM COMPONENT (40 CFR 68.175 / 19 CCR 5070.7)

PREVENTION PROGRAM 3		
(b) NAICS Code	488310	
(c) Substances Covered	Anhydrous Ammonia	
Process Safety Information		
(d) Date on which Safety Information was last reviewed	2/5/2026	
Process Hazard Analysis		
(e) Date of last PHA and the technique used	2/5/2026 / What-if & Checklist	
(e)(1) Expected or actual date of completion of all changes from the PHA	8/3/2028	
(e)(2) Major Hazards Identified	Toxic release	Over pressurization
	Earthquake	Equipment failure
	Corrosion	Loss of cooling, electricity
(e)(3) Process Controls in Use	Relief valves	Manual shutoff
	Automatic shutoff	Alarms & procedures
	Interlocks	
(e)(4) Mitigation Systems in Use	None	
(e)(5) Monitoring / detection Systems in Use	Stationary ammonia detection	
(e)(6) Changes since last PHA	N/A	
Operating Procedures		

(f) Date of the most recent review of the Operating Procedures	No procedures developed at this time	
Training		
(g) Date of the most recent review or revision of the Training Program	2/13/2026	
(g)(1) Type of Training Provided	Classroom	On the Job
(g)(2) Type of Competency Testing Used	Oral tests, observation, demonstration	
Mechanical Integrity		
(h) Date of the most recent review of the Maintenance Procedures	2/13/2026	
(h) Date of the most recent equipment inspection	2/5/2026	
Equipment most recently inspected or tested	Compressor (start-up process / testing)	
Management of Change		
(i) Most recent change that triggered an MOC	N/A – initial start-up	
(i) Most recent review or revision of MOC procedures	4/13/2026	
Pre-startup Safety Review		
(j) Date of the most recent pre-startup safety review	(Date when the system was started)	
Compliance Audit		
(k) Date of the most recent Compliance Audit	Will complete in 2029	
Expected or actual date of completion of all changes resulting from the Compliance Audit	N/A	
Incident Investigation		
(l) Date of the most recent Incident Investigation	N/A – Initial start-up	
Expected or actual date of completion of all changes resulting from the Incident Investigation	N/A	
Employee Participation		
(m) Date of the most recent review or revision of employee participation plans	4/14/2026	

Hot Work Permit	
(n) Date of the most recent review or revision of hot work permit procedures	4/14/2026
Contractor	
(o) Date of the most recent review or revision of contractor safety procedures	4/14/2026
(p) Date of the most recent evaluation of contractor safety performance	

Pursuant to the requirements of §5070.7(q); the following external events analysis information shall be submitted.

- *The types of natural and human caused external events considered in the PHA*

During the PHA, a range of plausible external events was evaluated and documented as part of the risk assessment. These included fire scenarios, flooding and severe weather, seismic events, aircraft impact, security-related concerns such as theft or vandalism, and other external conditions that could affect the refrigeration system.

General events external to the facility that can conceivably cause a release of ammonia were addressed. An earthquake was identified as the most credible external event.

- *The estimated magnitude or scope of external events which were considered. If not known, the owner or operator of the stationary source shall work closely with the UPA to determine what is required. If seismic events are applicable, the parameters used in the consideration of the seismic analysis and which edition of the Uniform Building Code was used when the process was designed.*

Seismic hazards were evaluated and addressed as part of the County permitting and plan review process prior to construction of the refrigeration system. The system design and installation were subject to applicable seismic requirements, and compliance was verified through plan review and permitting approvals before the system was authorized for construction.

- *The magnitude of the external events considered during the 2026 hazard review are detailed within the checklist worksheets.*
- *The most recent field verification of equipment installation and condition was completed on February 4, 2026. This verification was performed through a Minimum System Safety Evaluation (MSSE) conducted in accordance with ANSI/IIAR 9 guidance.*

E. EMERGENCY RESPONSE PROGRAM (40 CFR 68.180/19 CCR 5070.9)

EMERGENCY RESPONSE	
Is the facility included in a written community emergency response plan?	Not at time of this writing (only for tsunami)
Does the facility have its own written emergency response plan?	No, EAP
Does the facility's ER Plan include specific actions to be taken in response to accidental releases of regulated substances?	Yes
Does the facility's ER Plan include procedures for informing the public and local agencies responding to accidental releases?	Yes, notification list
Date of most recent review or update of facility's ER Plan	In development
Date of most recent ER Training for facility's employees	After development
Does the facility's ER plan include information on emergency health care?	Yes
Local Agency with which facility's ER Plan or response activities are coordinated	Fort Bragg fire department
Local Agency's Telephone Number	707-961-2831
Subject To:	State EPCRA Rules/Law, CCR, Title 8, Section 3220, Emergency Action Plan. Several required sections of the plan are detailed within this section. Some of the other regulations include OSHA Regulations at 29 CFR 1910.38, Clean Water Act Regulations at 40 CFR 112, and State EPCRA Rules or Laws.

F. RMP CERTIFICATION (40 CFR 68.185 / 19 CCR 2745.2 / 19 CCR 5070.10)

Noyo Harbor District certifies that the information contained in this CalARP Program RMP document is true, accurate and a complete reflection of the business practices and procedures currently employed by Noyo Harbor District Furthermore, Noyo Harbor District certifies that this CalARP Program RMP document has been prepared, to the best of the signer's knowledge, in accordance with California Code of Regulations Title 19 Division 5, Chapter 2.

Anna Neumann Date
Harbormaster
Noyo Harbor District

Per the California Health and Safety Code (HSC), Chapter 6.95, Article 2, Section 25535(a), an owner or operator of a stationary source submitting an RMP pursuant to this article shall submit the RMP to the UPA after the RMP is certified as complete by qualified person and the owner or operator.

Per HSC Section 25532(h) and a "Qualified Person" means a person who is qualified to attest, at a minimum, to the completeness of an RMP. Per CCR Title 19 Section 5050.3(hhh) a "Qualified Person" means a person means a person who is qualified to attest, at a minimum to: (1) the validity and appropriateness of the process hazard analyses (PHA) performed; (2) the completeness of a risk management plan; and (3) the relationship between the corrective steps taken by the owner or operator following the PHAs and those hazards which were identified in the analyses.

As a Qualified Person, I attest at a minimum the completeness of a risk management plan and to the relationship between the corrective steps taken by the owner or operator following the PHAs and those hazards which were identified in the analysis by a qualified person and the stationary source owner or operator.

Qualified Person

Anna Neumann Date
Harbormaster
Noyo Harbor District

As a Qualified Person, I attest at a minimum to the completeness of a risk management plan and to the validity and appropriateness of the process hazard analyses (PHA) performed.

Qualified Person

Michelle Schlefstein Date
PSM Program and Training Specialist
APCCO

G. UPDATES (40 CFR 68.190 / 19 CCR 5070.11)

Noyo Harbor District shall submit an updated RMP / CalARP program to the UPA as follows:

- Every five years from the date of the most recent update
- Within six months of a change that requires a revised hazard review
- Within six months of a change that requires a revised offsite consequence analysis
- Within six months of a change that alters the program level
- Within six months if the facility is no longer subject to the program regulations
- Within 30 days of a change in the owner or operator, the new owner or operator shall contact the UPA to update registration information

H. RMP CORRECTIONS (40 CFR 68.195 / 19 CCR 5070.12)

Noyo Harbor District shall correct the RMP as follows:

New accident history information – For any accidental release meeting the five-year accident history reporting criteria, Noyo Harbor District shall submit data with respect to that accident within six months of the release or by the time the RMP is updated under, whichever is earlier.

Emergency Contact information – Within one month of any change in the emergency contact information required, Noyo Harbor District shall submit a correction of that information.

I. COVERED PROCESS MODIFICATIONS (40 CFR 68.195 / 19 CCR 5070.13)

If Noyo Harbor District makes a modification to the covered process and the modification may result in a significant increase in either the amount of anhydrous ammonia as compared to the amount previously identified in the RMP or the risk of handling anhydrous ammonia as compared to the amount of risk identified in the RMP, Noyo Harbor District shall:

Notify Mendocino County UPA in writing with their intent to modify the Noyo Harbor District process at least five calendar days before implementing any modifications. Noyo Harbor District shall consult Mendocino County UPA to help determine whether the RMP should be reviewed and revised. If Noyo Harbor District cannot reasonably notify five days prior, Noyo Harbor District shall provide written notice to Mendocino County UPA no later than 48 hours following the modification.

Establish procedures to manage the proposed modification and notify Mendocino County UPA that the procedures have been established.

IV. HAZARD ASSESSMENT (40 CFR 68: Subpart B / 19 CCR CalARP: Article 4)

A. HAZARD ASSESSMENT (40 CFR 68.20 / 19 CCR 5080.1)

This analysis looks at the worst-case release scenario and alternative release scenarios. The purpose is to identify and address offsite hazards and dangers to the environment and to the surrounding community. This offsite planning adds a significant hazard review to the PSM Process Hazard Analysis used for the OSHA program. It goes beyond the building and property lines and/or addresses issues about how the release affects the neighbors, the community, and the environment.

For release modeling, the RMP separately addresses the release of toxic and flammable substances. Ammonia is classified as toxic substances for the RMP. It is not classified as a flammable substance.

To simplify the analysis and ensure a common basis for comparisons, the EPA has defined the worst-case scenario as the release of the largest quantity of a regulated substance from a single vessel or process line failure that results in the greatest distance to an endpoint. The released quantity is based on the maximum amount of the chemical that could be in the largest vessel and excludes piping volumes.

Noyo Harbor District must also identify and analyze at least one alternative release scenario for each covered chemical. This scenario must be one that is more likely to occur and that reaches an endpoint that is offsite. Examples include splits in or uncoupling of hoses, leaks from flanges or joints, leaks from valves or seals, leaks from broken pipes or equipment, punctures or breakage, or from vents or relief valves. EPA has generated several tables for both release scenarios to simplify the release modeling process.

The RMP must identify all sensitive public receptors in this Area of Concern. This provides vital emergency information to emergency response and planning operations to identify evacuation needs for the community.

NOTE: It is important to consider that the Worst-Case Scenario is extremely unlikely to occur since this scenario does not consider any safety features of the system - in either design or operation. The scenario parameters are established by regulations to provide uniformity for dialog between industry, community, and regulatory agencies.

B. SESIMIC ASSESSMENT (H&SC 25534.05(c) / 19 CCR 5090.2(c)(8))

Facilities located in Northern Coastal California are subject to heightened seismic design and permitting requirements due to regional seismicity and coastal site conditions. As part of the County permitting process, refrigeration systems and associated equipment are required to demonstrate compliance with applicable California Building Code seismic provisions and local jurisdictional requirements.

Permit submittals typically include engineered drawings and specifications prepared under the responsible charge of a licensed professional engineer. These submittals address equipment anchorage, piping supports, bracing, and load paths to ensure the system can withstand applicable seismic forces. County building officials review the submittals as part of the plan check process to verify compliance with adopted seismic design criteria prior to permit approval.

Installation is performed in accordance with the approved plans, and required inspections are conducted by the County to confirm compliance before final approval is granted. This permitting and review process provides assurance that the refrigeration system has been designed and installed to address seismic hazards appropriate for Northern Coastal California conditions.

C. OFFSITE CONSEQUENCE ANALYSIS PARAMETERS (40 CFR 68.22 / 19 CCR 5080.2)

The purpose of the Worst-Case release scenario analysis is to identify the potential reach and effect of hypothetical worst-case accidental releases. To identify off-site impacts which include environmental and public receptors.

The purpose of the Alternative release scenario analysis is to identify the potential reach and effect of hypothetical accidental releases under more realistic circumstances. To identify off-site impacts which include environmental and public receptors.
Noyo Harbor District shall submit the following information in the RMP:

One worst-case release scenario to represent all regulated toxic substances held above the threshold quantity (Note: this must be for the worst of the worst cases if there is more than one regulated chemical evaluated);

One worst-case release scenario to represent all regulated flammable substances held above the threshold quantity.

If the facility has additional processes that could affect different public receptors than above, additional worst-case scenarios are required.

One alternative release scenario for each regulated toxic substance held above the threshold quantity; and

One alternative release scenario to represent all regulated flammable substances held above the threshold quantity.

D. WORST CASE SCENARIO (40 CFR 68.25 / 19 CCR 5080.3)

Anhydrous ammonia is the toxic substance for which this assessment is done. The flammable endpoint of the CalARP regulation does not apply to ammonia and this process. The toxic endpoint for ammonia is 200 ppm.

The first step in the hazard assessment process was to identify the inventory calculations of the vessels in the ammonia refrigeration process. The vessel with the largest inventory was selected and used in the offsite consequence analysis.

The worst-case release scenario (OCA-1) evaluated the ammonia inventory associated with the high-pressure receiver and the suction accumulator. Based on their respective operating pressures and temperatures, the high-pressure receiver contains approximately 11 pounds more ammonia than the suction accumulator. However, under normal operating conditions the high-pressure receiver is not expected to contain the majority of the system's ammonia inventory because ammonia is continuously circulated throughout the refrigeration system; therefore, system inventory is distributed among multiple vessels and piping segments.

The worst-case release scenario is based on a vessel breach. According to the certified drawing and U1-A, the size of the vessel is 18" x 96" OAL. The maximum charge of the vessel is 439.4 lbs. at 80% with a saturation temperature of 85°F. The industry practice is to never fill vessels over 80% to account for vapor space. The anticipated inventory amount rounded to 2 significant digits (440 lbs.) was used for worst-case scenario release amount.

The duration of the worst-case release used for calculations is ten minutes resulting in a release rate of 44 lbs. pounds of ammonia per minute. RMPComp version 2.01 was used to determine the distance to the toxic endpoint. RMP Comp establishes an area of concern with a radius of 0.3 miles for the Worst-case Scenario.

Due to the surrounding equipment, building, fencing, etc. in the immediate area, an Urban surrounding terrain type was selected based on the description found in the RMP Guidance (see below).

> *Rural vs. urban sites*. The regulations require you to take account of whether your site is rural or urban. To decide whether the site is rural or urban, the rule offers the following: "Urban means that there are many obstacles in the immediate area; obstacles include buildings or trees. Rural means that there are no buildings in the immediate area and the terrain is generally flat or unobstructed." Some areas outside of cities may still be considered urban if they are forested.

Mitigation Measures Considered

The rule allows for consideration of passive mitigation in estimating the worst-case release rate. If the release takes place in a machine room, the machine room can be considered to provide passive mitigation, unless:

- The machine room may fail because of the release. This is unlikely except in the case of a large vessel in a very small room. As a rough rule of thumb, if the machine room volume (V) divided by the quantity of anhydrous ammonia (Q) released is less than 0.1 ft3/lb – the possibility exists that the release of ammonia will cause failures such as windows blowing out or doors blowing open.
- The release takes place facing an opening in the building (door or window). In this case assume that the door or window will be open, and the ammonia will be released through these openings.

No mitigation measures were considered.

Estimated Distance Calculation

Estimated distance to toxic endpoint: 0.3 miles (0.5 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Ammonia (anhydrous)
CAS number:	7664-41-7
Threat type:	Toxic Gas
Scenario type:	Worst-case
Physical state:	Liquefied under pressure
Quantity released:	440 pounds
Release duration:	10 min
Release rate:	44 pounds per minute
Mitigation measures:	NONE
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.14 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	1.5 meters/second (3.4 miles/hour)
Stability class:	F
Air temperature:	77 degrees F (25 degrees C)

Since Marplot has not released an updated version to fix Google maps and use 2020 census data, another website was used to get the population count.

Request details:

- Center point name: **Noyo Harbor District Ice Machine**
- Latitude **39.422939**
- Longitude **-123.80215**
- Selected radii: **0.3**

[CSV file of aggregated data] [text file of all geographic areas used]

0.3-mile radius of specified point (Noyo Harbor District Ice Machine)

Subject	Number
D1. AGE	
Universe:	
Total population	165

E. ALTERNATE RELEASE SCENARIO (40 CFR 68.28 / 19 CCR 5080.4)

According to CalARP regulations, Noyo Harbor District shall select a scenario that:

- Is more likely to occur than the worst-case release scenario
- Will reach an endpoint offsite, unless no such scenario exists; and,
- Will reach a public receptor, unless no such scenario exists

The regulation lists release scenario that Noyo Harbor District should consider but is not limited to the following where applicable. The following scenarios were discussed with facility personnel and responses are provided:

- Transfer hose releases due to splits or sudden hose uncoupling
  - Response: Ammonia rated hoses are only used when adding ammonia to the system. Aside from infrequent ammonia deliveries, the unloading operation is closely supervised by the refrigeration contractor and facility personnel.
- Process piping releases from failures at flanges, joints, welds, valves and valve seals, and drains or bleeds
  - Response: This scenario was evaluated because valve-related failures represent a credible release mechanism. However, it was not selected as the alternate release scenario, as another evaluated scenario involved a larger release quantity and a greater potential to reach an offsite receptor.
- Process vessel or pump releases due to cracks, seal failure, drain, bleed, or plug failure
  - Response: The refrigeration system does not have a pump installed.
- Vessel overfilling and spill, or over pressurization and venting through relief valves or rupture disks

  - Response: The alternate release scenario assumes ammonia release through the largest installed relief valve, which presents a greater potential to reach offsite receptors.
- Shipping container mishandling and breakage or puncturing leading to a spill
  - Response: This event is not possible as shipping containers are not utilized.

The alternate release scenario (OCA-2) for the ammonia refrigeration system assumes lifting of a compressor pressure relief valve due to an overpressure condition or valve malfunction. In the overpressure case, the scenario assumes the high discharge pressure safety does not function as intended or is set above the relief setpoint, resulting in PRV activation.

Compressor high-pressure cutouts are typically set at 200 psig. Given the mild ambient conditions at the site and assuming premature valve activation, a discharge pressure of 180 psig was used for this analysis. At this pressure, the calculated release rate is approximately 200 pounds per minute, based on a flow rate of 724 scfm. The resulting release amount is as follows.

Gas Release--Round Opening	
Diameter of Round Hole (In Inches)	1.25
Gauge Pressure (psig)	180.0
Number of Minutes Released	3.0
Gas Flow Rate (lb/min)	**200.26**
Total Vapor Relased (lb)	**601**

Noyo Harbor District has conservatively ignored likely passive mitigation by the machine room and has prepared the alternate-case as an unmitigated release.

Estimated Distance Calculation

Estimated distance to toxic endpoint: 0.1 miles (0.2 kilometers)

This is the downwind distance to the toxic endpoint specified for this regulated substance under the RMP Rule. Report all distances shorter than 0.1 mile as 0.1 mile, and all distances longer than 25 miles as 25 miles.

Scenario Summary

Chemical:	Ammonia (anhydrous)
CAS number:	7664-41-7
Threat type:	Toxic Gas
Scenario type:	Alternative
Physical state:	Liquefied under pressure
Release duration:	3 minutes
Release rate:	200 pounds per min
Mitigation measures:	NONE
Surrounding terrain type:	Urban surroundings (many obstacles in the immediate area)
Toxic endpoint:	0.14 mg/L; basis: ERPG-2

Assumptions about this scenario

Wind speed:	3 meters/second (6.7 miles/hour)
Stability class:	D
Air temperature:	77 degrees F (25 degrees C)

Since Marplot has not released an updated version to fix Google maps and use 2020 census data, another website was used to get the population count.

Request details:

- Center point name: **Noyo Harbor District Ice Machine**
- Latitude **39.422939**
- Longitude **-123.80215**
- Selected radii: **0.1**

[CSV file of aggregated data] [text file of all geographic areas used]

0.1-mile radius of specified point (Noyo Harbor District Ice Machine)

Subject	Number
D1. AGE	
Universe:	
Total population	4

Summary of Release Scenarios

	OCA-1 Worst-case Scenario	OCA-2 Alternate case Scenario
Total Released	440	600
Release Rate (lbs. / min)	44	200
Duration (mins.)	10	3
Mitigatated Release	No	No
Terrain Type	Urban	Urban
Relative Humidity	50%	50%
Wind Speed	1.5 meters / second	3 meters / second
Stability Class	F	D
Air Temperature	77°F	77°F
Distance to Endpoint	0.3	0.1

F. OFF-SITE RECEPTORS - POPULATION (40 CFR 68.30 / 19 CCR 5080.5)

Receptor Categories	Worst-case Release Scenario	Alternate Release Scenario
Residences	**Yes**	**Yes**

Receptor Categories	Worst-case Release Scenario	Alternate Release Scenario
Schools	No	No
Hospitals	No	No
Prison / Correctional Facilities	No	No
Recreational Areas (arenas, parks, campgrounds, etc.)	No	No
Major commercial, office, or industrial areas	**Yes**	No
Other:		

G. OFF-SITE RECEPTORS - ENVIRONMENTAL (40 CFR 68.33 / 19 CCR 5080.6)

This report examined the neighboring community to identify the environmental receptors The Distance to Toxic Endpoint was used as the radius of the circle defining the Area of Concern. The table below identifies the receptor category for each type of receptor that is totally or partially within the Areas of Concerns of either release scenario.

Receptor Categories	Worst-case Release Scenario	Alternate Release Scenarios
National or State Parks, Forests, or Monuments, etc.	No	No
Officially Designated Sanctuaries, Preserves or Refuges	No	No
Federal Wilderness Areas	No	No
Waterways, Rivers, or Wetlands Directly Receiving Storm-water Run-off **Noyo River**	**Yes**	**Yes**
Other:		

H. OFFSITE CONSEQUENCE ANALYSIS REVIEW AND UPDATE (40 CFR 68.36 / 19 CCR 5080.7)

Noyo Harbor District shall document the review and revision of the offsite consequence analysis at least once every five years.

If there are changes to the process, inventory quantity, or any other aspect of the ammonia refrigeration system that might increase or decrease the distance to the endpoint by a factor of two or more, Noyo Harbor District shall complete a revised analysis within 6 months of the change taking place. Noyo Harbor District shall submit a revised RMP.

I. FIVE YEAR ACCIDENT HISTORY (40 CFR 68.42 / 19 CCR 5080.9)

The five-year accident history involves an examination of the effects of any accidental release of regulated substances from covered processes that must be reported in the RMP. Reportable releases must have caused at least one of the following:

- On-site deaths, injuries, or significant property damage of $50,000 or more; or
- Known offsite deaths, injuries, property damage, environmental damage, evacuations, or sheltering in place.

An extensive and detailed history is required for each reportable accident. The following is a list of the general data categories:

- Date, time and approximate duration of release
- Estimated quantity (in pounds)
- Five or six-digit NAICS code that most closely corresponds to the process
- Type of release (vapor, liquid, etc.) and where it released from
- Weather conditions, if known
- On-site impacts
- Known offsite impacts
- Initiating event and contributing factors
- Whether offsite responders were notified
- Process and/or operational suggestions from the investigation and that have been made by the time the information is submitted

This is an initial submittal, so Noyo Harbor District does not have a five-year accident history.

V. PROGRAM 3 PREVENTION PROGRAM (40 CFR 68: Subpart D / 19 CCR CalARP: Article 6)

PROGRAM 3 REQUIREMENTS

Ammonia in amounts that exceed the threshold quantity of 500 pounds by CalARP but is under the federal threshold quantity of 10,000 pounds in a single process is used in the Noyo

Harbor District system. Due to UPA request, Program 3 prevention program for Noyo Harbor District includes the following:

- Process Safety Information
- Process Hazard Review
- Operating Procedures
- Training
- Mechanical Integrity
- Management of Change
- Pre-startup Safety Review
- Compliance Audits
- Incident Investigations
- Employee Participation
- Hot Work Permit
- Contractors
- Emergency Response Planning

A. PROCESS SAFETY INFORMATION (40 CFR 68.65 / 19 CCR 5100.1)

Process safety nnformation includes a wide variety of books, manuals, and process information. These are available to employees that operate, maintain, or repair the process equipment or piping. There are five major categories of information: ammonia data such as SDS, safety information, first aid, chemical properties, IIAR safety bulletins, etc.; inventory of equipment in the covered process; safe operating limits, and ramification of process deviation; process equipment information such as equipment specifications, electrical classifications, materials of construction, installation manuals, operating and maintenance manuals, and manufacturer’s manuals; and design codes and standards.

Noyo Harbor District maintains the following up-to-date process safety information for the facility’s covered process.

A-1 REGULATED SUBSTANCE INFORMATION (40 CFR 68.65(b) / 19 CCR 5100.1(b)

Noyo Harbor District maintains a Safety Data Sheet (SDS) containing required information on the anhydrous ammonia used in the Noyo Harbor District covered process. The SDS contains:

1. Toxicity information
2. Permissible exposure limits
3. Physical data
4. Reactivity data

5. Corrosivity data
6. Thermal and chemical stability data
7. Hazardous effects of inadvertent mixing

A-2 TECHNOLOGY INFORMATION (40 CFR 68.65(c) / 19 CCR 5100.1(c)

Noyo Harbor maintains required process safety information pertaining to refrigeration equipment technology, including:

1. Block flow diagram or simplified process flow diagram
2. Process chemistry
3. Maximum intended inventory
4. Safe upper / lower limits – temperature, pressures, and flows
5. Evaluation of the consequences of deviation

Block Flow Diagram

A formal block flow diagram has not yet been developed for the refrigeration system. The facility currently relies on available process safety information, including equipment documentation and system descriptions, to support safe operation. Development of a simplified system diagram may be considered as part of ongoing program improvements. The following is a description of what the block flow diagram would illustrate.

The facility operates a closed-loop, single-stage, automated ammonia refrigeration system designed to support the North Star ice maker. The system operates on the principle of latent heat absorption during vaporization and latent heat rejection during condensation. Ammonia circulates continuously through the system to absorb heat from the ice-making process and reject that heat to the atmosphere via an evaporative condenser.

High-pressure liquid ammonia is stored in the high-pressure receiver. From the receiver, liquid ammonia is supplied to the suction accumulator, which also functions as a flash cooler due to the internal cooling coil. Subcooled liquid ammonia from the suction accumulator is then supplied to the ice maker surge drum. A separate liquid line from the high-pressure receiver provides liquid injection for compressor oil cooling.

As liquid ammonia passes through the expansion device into the low-pressure side of the system, its pressure is reduced to evaporator pressure, resulting in partial flash vaporization. The surge drum supplies liquid ammonia by gravity to the North Star ice maker. Within the ice maker, low-pressure ammonia circulates through the shell side while water circulates on the opposite side of the heat exchange surface, allowing

heat transfer that produces ice. The ice maker is defrosted using scheduled air defrost cycles.

Vapor-liquid phase separation occurs in the suction accumulator to ensure only dry vapor is returned to the compressor. The vessel is designed to capture and retain any entrained liquid ammonia carried over from the evaporator or surge drum, thereby preventing liquid slugging of the compressor. An internal heat exchange coil is installed within the suction accumulator to promote vaporization of any accumulated liquid ammonia. The coil provides controlled heat input to boil off retained liquid refrigerant, ensuring that vapor returned to the compressor remains in a dry, superheated state under normal operating conditions.

Low-pressure ammonia vapor exiting the suction accumulator is then compressed to a high-pressure, superheated vapor state and discharged to the evaporative condenser.

In the evaporative condenser, high-pressure vapor is first desuperheated and then condensed to high-pressure saturated liquid through heat rejection to water and air. Water is sprayed over the condenser coils while air is drawn counterflow across the wetted surface. Evaporation of the water enhances heat removal, allowing the ammonia vapor to condense. The resulting high-pressure liquid drains by gravity back to the high-pressure receiver, completing the cycle.

All pressure relief valves protecting the ammonia refrigeration system are hard piped to a relief header that discharges to atmosphere at a designated termination point. The discharge piping is arranged to direct relief flow away from occupied areas and equipment in accordance with applicable refrigeration safety standards.

Process Chemistry

The ammonia refrigeration system is a closed system that is operated by a combination of manual and automatic controls. There are no chemical reactions involving ammonia that occur in a closed loop mechanical refrigeration system. The principle involved is the ability of a refrigerant, in this case ammonia, to absorb heat as it changes state from a liquid to a gas and to give up that heat as it changes back to a liquid. The change in pressure levels required to accomplish this is supplied by the compressors. The heat is absorbed in the cooling evaporators of various designs and removed from the system by the condensers. Ammonia continuously cycles through the closed system and is not handled by the site operations or maintenance staff for any reason under normal operation.

Contamination of the ammonia refrigeration system by oil, air, water, dirt, and other foreign matter may cause operational problems in the system, but there are no chemical reactions which typically occur between ammonia and these contaminants. Air and other non-condensable gases may potentially lead to increased high side operating pressures. Dirt and foreign matter may lead to malfunctioning solenoids, regulating valves, and may prevent the full sealing of manual valves. Dirt also may lead to excessive parts replacement. Water may mix with oil to form sludge and may cause parts to malfunction. Water may also decrease system efficiencies and may cause metal system components to corrode.

Maximum Intended Inventory

The maximum intended ammonia inventory at the time of initial system charge is 600 pounds. During normal operation, minor adjustments to the refrigerant charge may be required to maintain proper system performance and prevent equipment from operating under low-charge (“starved”) conditions. Any additional ammonia added is controlled and documented in accordance with facility procedures.

Safe Upper and Lower Limits

Safe upper and lower operating limits have been established for major ammonia system components to define the acceptable operating envelope and to identify conditions that could reasonably lead to loss of containment, equipment damage, or defeat of safeguards. These limits support operating procedures, alarm and shutdown setpoints, and operator response actions.

Low side:	Undetermined at this time
High side:	150 to 180 psig (73˚F to 84˚F)

Limits are based on vessel nameplate data, piping design ratings, relief valve setpoints, manufacturer documentation, system design intent, and applicable RAGAGEP, including ANSI/IIAR standards. Where numeric instrumentation is not present, limits are controlled through procedures and physical configuration.

High Pressure Receiver (HPR)

Pressure

- **Safe upper limit:**
  Not to exceed the lowest of:
  - Vessel MAWP
  - Relief valve set pressure
  - Condensing pressure above which system controls are no longer effective
- **Safe lower limit:**

Sufficient pressure to maintain stable liquid feed to downstream vessels and prevent flashing in liquid lines.

Liquid Level

- **Safe upper limit:**
  Level that maintains required vapor space and prevents overfilling that could impair pressure control or relief capacity.
- **Safe lower limit:**
  Level that ensures adequate liquid inventory to support system demand and avoid cavitation or feed interruption.

Basis: Vessel nameplate, relief valve sizing basis, condenser control strategy.

Suction Accumulator

Pressure

- **Safe upper limit:**
  Limited by vessel MAWP and compressor suction design pressure.
- **Safe lower limit:**
  Maintained above conditions that could result in unstable compressor operation or air ingress.

Liquid Level

- **Safe upper limit:**
  Below the level that could allow liquid ammonia carryover to compressors (slugging risk).
- **Safe lower limit:**
  Sufficient to ensure proper oil return and stable suction conditions.

Basis: Compressor manufacturer requirements, vessel design data, P&IDs.

Surge Drums

Pressure

- **Safe upper limit:**
  Below vessel MAWP and relief valve set pressure.
- **Safe lower limit:**
  Maintained above minimum operating pressure required for stable recirculation and control.

Liquid Level

- **Safe upper limit:**
  Below high-high level that could result in liquid carryover into suction lines or transfer piping.
- **Safe lower limit:**
  Above minimum level required to prevent pump cavitation and maintain evaporator feed.

Basis: Pump design requirements, vessel design, level control philosophy.

Ice Maker (Ammonia Evaporator / Shell Side)

Pressure

- **Safe upper limit:**
  Limited by the design pressure of the ice maker shell, associated low-side piping, and relief protection devices. The upper limit ensures the vessel remains within its rated working pressure and prevents activation of pressure relief devices under normal operating conditions.
- **Safe lower limit:**
  Maintained above vacuum conditions to prevent air and moisture ingress into the system and to ensure stable evaporator performance and proper liquid feed from the surge drum.

Temperature

- **Safe upper limit:**
  Maintained to ensure adequate heat absorption for proper ice formation and to prevent loss of cooling capacity that could affect ice production efficiency.
- **Safe lower limit:**
  Limited to prevent excessive ice buildup on heat transfer surfaces, freezing of unintended components, or mechanical stress to the evaporator shell and internal surfaces.

Basis: Ice maker design documentation, evaporator pressure-temperature relationships for ammonia, process load calculations, and system operating procedures.

Control, Alarms, and Safeguards

- Automatic controls, pressure regulators, level controls, and temperature controls maintain operation within defined limits.
- Alarms provide early warning when limits are approached; shutdowns or interlocks prevent exceedance where applicable.
- Operators are trained to respond per documented SOPs when operating parameters approach or exceed safe limits.

Compressors

Safe operating limits are established for compressors to prevent mechanical damage, loss of containment, and abnormal discharge conditions that could propagate through the system.

Suction Pressure

- **Safe upper limit:**
  Limited by compressor design suction pressure and associated vessel MAWP.
- **Safe lower limit:**
  Maintained above conditions that could result in unstable operation, excessive compression ratios, or air ingress.

Discharge Pressure

- **Safe upper limit:**

Not to exceed the lowest of:
  - Compressor discharge design pressure
  - Downstream piping or vessel MAWP
  - Relief valve set pressure
- **Safe lower limit:**
  Sufficient to maintain stable flow to condensers without control instability.

Discharge Temperature

- **Safe upper limit:**
  In accordance with compressor manufacturer recommendations to prevent oil breakdown, seal damage, or mechanical failure.
- **Safe lower limit:**
  Maintained above conditions that could result in oil dilution or poor lubrication.

Oil System Parameters

- **Safe upper and lower limits:**
  Established for oil pressure, oil temperature, and oil level to ensure proper lubrication and avoid compressor damage.

Basis: Compressor manufacturer documentation, system design, control setpoints, and RAGAGEP.

Consequences of Deviation

Consequences of deviating from operating limits and procedural instructions will be included in SOPs, found in OEM manuals, and the consequences were evaluated as part of the process hazard analysis. The following lists general consequences of deviations.

<u>Pressure</u>

Exceeding 250 psig on the high side or equipment ratings on the low side of the system may result in 1) system or component shutdowns, 2) venting of pressure and ammonia through pressure relief valves, or 3) component ruptures with a resulting ammonia release.

Excessively low pressures may result in 1) excessive energy consumption, 2) system or component shutdowns, and/or 2) premature equipment wear.

Steps to correct such deviations include startup of additional compressors, ensuring condensers are working properly, observing safe work practices such as not isolating liquid ammonia without room for expansion, and training operators to run the system and equipment properly.

Vessel Liquid Level

Overfilling of vessels may result in 1) system or component shutdowns, 2) venting of pressure and ammonia through pressure relief valves, or 3) compressor ruptures with a resulting ammonia release.

Low levels may result in 1) reduced ability to chill product, 2) pump cavitation and eventual overheating and seal damage, or 3) overheating of compressors.

Steps to correct such deviations include conducting regular rounds to ensure normal liquid level controls are functioning properly, maintaining levels alarms and cutouts in good working condition, and verifying function through regular tests, and training operators to run the system and equipment properly.

Temperature

Excessively high temperatures may result in 1) equipment damage including seal leakage, 2) loss of ability to chill product, or 3) high head pressures and eventual pressure relief valve activation.

Excessively low temperatures may result in 1) excessive energy consumption, 2) system or component shutdowns, and/or 2) premature equipment wear.

Steps to correct such deviations include shutting down malfunctioning equipment, maintaining temperature alarms and cutouts in good working condition, and verifying function through regular tests, and training operators to run the system and equipment properly.

Oil Level

High compressor oil levels are not generally hazardous in systems with screw compressors with horizontal oil separators. Vertical separator high oil levels can cause compressor slugging; this is prevented with functional compressor check valves. Low levels will result in compressor shutdowns, compressor overheating and potentially seal damage and leaks.

Steps to correct such deviations include monitoring oil levels and pressures, maintaining oil temperature and pressure alarms and cutouts in good working condition and verifying function through regular tests.

Procedures

Failure to follow procedures may result in a broad range of consequences including catastrophic release or personal injury.

Steps to Avoid Deviations
Procedures to avoid deviations are documented in the SOPs and in specific equipment owner's manual troubleshooting sections. In general, operating the system within limits and following established procedures help to avoid deviations. If there is any doubt as to whether the system can be run safely, it should be shut down.

A-3 EQUIPMENT INFORMATION (40 CFR 68.65(d) / 19 CCR 5100.1(d)

Noyo Harbor maintains required process safety information pertaining to the refrigeration equipment, including:

1. Materials of construction
2. P&IDs
3. Electrical classification
4. Relief design and design basis
5. Ventilation design and design basis
6. Design codes and standards
7. Material and energy balance
8. Safety systems

Materials of Construction

Materials used in the construction of the Noyo Harbor District refrigeration system are suitable for ammonia refrigerant at the temperature and pressure to which the components will be subjected. Materials that will deteriorate because of the presence of ammonia, lubricating oil, or any normal contaminant such as air or water are not used. The materials of equipment that will be exposed to the corrosive effects of air, water, or other media are suitable for that application. The following is a general list of materials of construction that comply with recognized and generally accepted good engineering practices. For more specific information on the materials, refer to the OEM, U-1A, and the PSI prevention program document.

Piping Specifications

- All pipe, flanges and fittings must be suitable for ammonia refrigerant at the temperature and pressure to which the component may be subjected.
- No material may be used that may deteriorate because of the presence of ammonia refrigerant or lubricating oil.
- Components in direct contact with ammonia shall not contain copper, brass, mercury, or alloys of these materials.
- Pipe shall be inspected prior to installation and if it does not meet standards for type, grade, or schedule, or if it is not stenciled or tagged, or otherwise verifiable, it is rejected.

- Pipe shall be new, clean, and free of rust, scale, sand, and dirt.
- All carbon steel refrigeration piping shall be ASTM A106, ASTM A333 Grade 1 or 6, or ASTM A53 Grade A or B pipe in Type E or S.
- Pipe temperatures below -20°F reference to ASME/ANSI B31.5 paragraph 523.2.2 is required. In these cases, impact tested pipe and fitting materials such as SA333, grade 6, is required or stress analysis must be made of the piping system in accordance with the above
- Welded carbon steel piping shall meet at least the following schedules:
  - 1 1/2 inches and smaller - schedule 80
  - 2 inch through 6 inch - schedule 40
  - 8 inch through 12 inch - schedule 20
  - 14 inch and larger - schedule 10
- ASTM A120 or A53/A120, ASTM A53 pipe not carrying identification as Grade A or B or carrying the identification Grade F (furnace welded) shall not be used for ammonia refrigeration service. Cast iron and wrought iron pipe shall not be used for ammonia refrigeration service.
- Stainless steel piping shall be ASTM A312, Type 304, 304L, 316, or 316L. Welded stainless piping 1 1/2 inches and smaller shall be schedule 40. Welded stainless piping 2 inches and larger shall be schedule 10.
- All threaded piping shall be no less than schedule 80, except stainless tubing and associated compression fittings.
- All fittings shall match pipe schedules. Screwed fittings shall be forged or cast steel. Fittings shall be ASTM A105, ASTM A234, ASTM A420, or stainless ASTM A403.
- Flanges shall be ASTM A105, ASTM A181, ASTM A707, or stainless ASTM A403.
- Bolting shall be ASTM A307, ASTM 320, or stainless ASTM A193.
- Pipefitting is observed and inspected by the supervisor responsible who verifies that work meets applicable codes and standards, and that components used are suitable for the service intended prior to accepting work.

Insulation Specifications

Insulation used in ammonia refrigeration systems is selected to minimize heat gain, prevent condensation and ice formation, protect personnel, and maintain energy efficiency. Materials must be compatible with ammonia and suitable for the operating temperature range of the system, often between -60°F and 40°F. Closed-cell insulation types are typically recommended to prevent moisture intrusion and ammonia permeation. Insulation systems must also include an appropriate vapor barrier to prevent corrosion under insulation (CUI) and maintain thermal performance over time.

General Specifications:

- **Material Type:** Closed-cell insulation such as cellular glass, polyurethane, polyisocyanurate (PIR), or elastomeric foam.
- **Operating Temperature Range:** -60°F to 150°F (depending on system design).
- **Vapor Barrier:** Required; typically, a multi-ply vapor retarder jacketing system (e.g., aluminum or PVC jacket with sealed joints).
- **Thickness:** Typically, 1–3 inches, depending on pipe size, ambient conditions, and energy performance requirements.
- **Mechanical Protection:** Insulation should be protected from physical damage, UV degradation, and moisture using appropriate jacketing.

Piping & Instrumentation Diagrams (P&ID)

Piping and instrumentation diagrams (P&IDs) providing detailed representation of system piping and controls are not currently in place. The facility utilizes existing process safety information and system familiarity to support operations, with development of formal P&IDs identified as a future improvement to enhance documentation.

The typical P&ID set may include an index sheet, legend sheet, equipment schedule, block flow diagram, and the specific P&IDs. According to Appendix A, Guidelines for Preparation of Ammonia Refrigeration Diagrams (IIAR 2021, Ammonia Refrigeration Piping Handbook), some of the suggested P&IDs inclusions are:

- Refrigerant pipes, valves, and fittings
  - Valves including control, hand shut-off (vents, drains, bleeds, isolation, etc.) and pressure relief
- Permanent instruments and sensors, pressure transducers, transmitters, thermometers, pressure gauges, drainer valves, float switches that are physically connected to ammonia lines.
- Legends for symbols and abbreviations as well as flow direction arrows
- Line size, designation, and purpose
- System controls, including instrumentation (i.e., pressure and temperature indicators and sensors, level switches, controls, etc.) as it relates to the system control requirements

Electrical Classification

The National Electrical Code classifies anhydrous ammonia among Flammable Gases and Vapors of Liquids having Flash Points below 100ºF in Article 500, Section 3. This designation is normally called a Class I, Group D location requiring explosion proof electrical equipment. The code does allow an exception to this rule.

The exception is stated as follows:

Exception: For atmospheres containing ammonia, the authority having jurisdiction for enforcement of this code shall be permitted to reclassify the location to a less hazardous location or non-hazardous location, if the ammonia room meets the requirements of the applicable code.

Article 500 also references ANSI/ASHRAE-15 as it relates to ammonia room ventilation. See the ventilation section of this document. If all code requirements have been met, it is normal that an ammonia machinery room be classified as a non-hazardous location requiring general purpose electrical equipment and enclosures.

Relief System Design and Design Basis

Relief valves protect both the high and low sides from an overpressure situation. At each vessel there are two relief valves attached to a 3-way valve. One valve is active while the other is inactive. This enables changing out relief valves without pumping down the vessel. Low and high side relief valves are set to release at 250 or 300 psig respectively.

The design basis for pressure relief valves, including sizing and setpoint justification, is not currently documented. The facility has requested this information and is working to obtain supporting documentation. Existing relief devices are assumed to be appropriately selected based on system design and are maintained accordingly.

Ventilation System Design

Ventilation design basis documentation, including system capacity and performance criteria, is not currently maintained on-site. The facility has initiated a request to obtain this information and has identified this as an area for follow-up under ongoing process safety program improvements.

Codes and Standards

The Noyo Harbor District covered processes and all associate process components have been designed and installed according to the California Building, Mechanical, Fire, Plumbing and Electrical Codes applicable at the time of installation.

The information pertaining to process equipment design must be documented. In other words, it must define the codes and standards that were used to establish good engineering practices. These codes and standards are published by organizations such as the American Society of Mechanical Engineers (ASM), American National Standards Institute (ANSI), National Fire Protection Association (NFPA), American

Society for Testing and Materials (ASTM), National Association of Corrosion Engineers, American Society of Exchange Manufacturers Association, and Model Building Code groups.

Noyo Harbor District 's refrigeration system was installed in January 2026. The applicable codes and standards are listed below.

2022 California Mechanical Code, Chapter 11
2022 California Fire Code, Chapter 605
2022 California Building Code
2022 ANSI/ASME B31.5
ANSI/IIAR 2-2021
ANSI/IIAR 4-2020
2023 NFPA 70 (National Electrical Code)
2022 California Electrical Code
2022 California Plumbing Code
2022 California Green Building Standards Code (CALGreen)
2022 California Energy Code
ASME VIII, Division 1, Pressure Vessel Code

Noyo Harbor District ensures that the covered process is designed, built, and operates with recognized and generally accepted good engineering practices by a multi-pronged approach. The most important aspect is that it was installed and designed to meet ANSI/IIAR 2-2021. Another industry-specific design code and standard is ANSI/IIAR 6 *Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems*. If a facility is following the ITM schedule listed, it helps to document that the covered process is maintained according to good industry practices.

Lastly, Noyo Harbor District ensures that the covered process is designed, built, and operates with recognized and generally accepted good engineering practices through the hazard review process and a Minimum System Safety Evaluation (MSSE) an ANSI/IIAR 9 requirement for existing systems.

Safety Systems

The refrigeration system is equipped with safety systems intended to support safe operation and minimize the potential for ammonia releases. A summary of key systems is provided below:

Safety System	Function	Notes / Current Status
Pressure Relief Devices (PRVs)	Protect vessels and piping from overpressure by relieving to a safe location	Design basis documentation is being obtained; devices are installed and maintained
Ammonia Detection System	Detects presence of ammonia and initiates alarms to alert personnel	Installed in machinery room; alarm setpoints and interlocks under review
Mechanical Ventilation	Removes ammonia vapors and maintains safe atmosphere in enclosed areas	Design basis documentation in progress; system operational
Emergency Shutdown (E-Stops)	Allows rapid shutdown of compressors and associated equipment	Installed at key locations; verification of function ongoing
Compressor Safeties	Protect compressors from unsafe conditions (e.g., high pressure/temp, low oil pressure)	Safeties installed; setpoints and testing documentation being compiled
High Liquid Level Controls	Prevent overfilling of vessels and potential liquid carryover	Level controls and/or alarms in place; documentation under development
Electrical Safeguards	Reduces ignition risk and supports safe equipment operation	Installed per applicable codes; documentation being reviewed
Alarms and Notifications	Provides audible/visual alerts for abnormal conditions	System in place; alarm response procedures being refined

This table represents a general summary of safety systems currently in place. Additional details, including design criteria, setpoints, and verification records, is being developed as part of ongoing process safety program improvements.

Documentation

Documentation demonstrating that equipment complies with the criteria established in this program element, and in accordance with recognized and generally accepted good engineering practices (RAGAGEP), is maintained through multiple sources.

This includes completion of system evaluations in alignment with applicable industry guidance. An evaluation consistent with International Institute of Ammonia Refrigeration (ANSI/IIAR 9) has been completed to assess the refrigeration system

against current industry safety standards and to support demonstration of compliance with applicable requirements.

As a newly installed system, the equipment was designed and constructed in accordance with codes and standards that remain in current use. Compliance is supported through available design documentation, manufacturer information, and installation records.

Annual inspections in accordance with ANSI/IIAR 6 are typically used to support ongoing verification of equipment condition and continued compliance. As the system has been in operation for less than one year, these inspections have not yet been completed but will be incorporated into the facility's mechanical integrity program moving forward.

Ongoing demonstration of safe operation will be achieved through a combination of routine monitoring, preventive maintenance, and periodic inspection activities. This includes defined safe operating parameters established within standard operating procedures (SOPs), as well as routine operator rounds to ensure the system remains within acceptable limits and that deviations are promptly addressed.

Additional supporting documentation will include regularly scheduled preventive maintenance activities and periodic in-depth mechanical integrity inspections conducted in alignment with ANSI/IIAR 6 guidance.

Supplemental documentation may include manufacturer-provided materials such as ASME Manufacturer's Data Reports (e.g., U-1, U-1A, U-2, R-1 forms), as well as fabrication and installation drawings, equipment specifications, and vendor manuals.

B. PROCESS HAZARD ANALYSIS (40 CFR 68.67 / 19 CCR 5100.2)

The process hazard analysis is used to identify hazard scenarios, associated with the covered process. It then identifies the engineering and administrative controls that are in place or are needed to minimize the risks. A qualitative risk factor is calculated. Safety equipment and procedures are reviewed to determine if appropriate engineering and administrative controls are in place. If the current level of protection is determined insufficient, recommendations are made to eliminate and/or mitigate the potential risk in addition it monitors the implementation of corrective measures.

General items and areas addressed by the process hazard analysis are summarized below. More detailed responses are documented in the process hazard analysis.

1. The hazards associated with the process and the system charge;

2. Opportunities for equipment failure, human error, or external events that could cause an accidental release;
3. Safeguards, including engineering and administrative controls, used or needed to control hazards or prevent equipment malfunction or human error;
4. Steps used or needed to detect or monitor releases.

The Process Hazard Analysis (PHA) evaluates the ammonia refrigeration system as a whole, focusing on how the process operates under normal and abnormal conditions and where failures could occur. The analysis considers the inherent hazards of anhydrous ammonia, including its toxicity, pressure, and potential for rapid release, along with equipment-specific risks such as overpressure, liquid carryover, and loss of containment.

As part of the evaluation, the team reviews any prior incidents or near-misses that had the potential for significant consequences. This ensures that past events are not repeated and that lessons learned are incorporated into current safeguards and operating practices.

Existing engineering and administrative controls are reviewed in detail to understand how hazards are prevented or mitigated. This includes safety systems such as pressure relief devices, detection systems, alarms, ventilation, and automatic shutdown controls, as well as administrative measures like operating procedures, training, and maintenance practices. Particular attention is given to how these controls work together, including the role of detection systems and instrumentation in providing early warning of abnormal conditions or releases.

The analysis also considers what could happen if these safeguards fail or are not followed as intended. This includes evaluating scenarios where equipment malfunctions, controls are bypassed, or human error occurs, and identifying whether additional layers of protection may be needed.

Facility siting is evaluated to understand how the location of equipment, occupied areas, and access points may influence the consequences of a release, both for on-site personnel and surrounding receptors. This includes consideration of how a release could impact employees, contractors, emergency responders, and nearby areas.

Human factors are also incorporated into the analysis, recognizing that operator interaction with the system plays a critical role in safe operation. This includes evaluating procedure clarity, accessibility of controls, communication, workload, and the potential for human error under both routine and upset conditions.

A qualitative evaluation is performed to understand the range of potential safety and health impacts associated with identified scenarios. This helps the team prioritize risks and focus

on areas where improvements to safeguards or procedures may be warranted. Based on the risk that resulted from the qualitative evaluation, the need for and priority of risk reduction recommendations was determined. See the process hazard analysis report for the risk ranking tables.

The PHA also considers external events that could affect the system, such as seismic activity or other site-specific hazards.

The process hazard analysis Leader must be trained in the specific technique used. A scribe can be used to accurately record the analysis. A team member must have technical knowledge and experience in covered process design and operation. Management must be represented and have the authority to execute process hazard analysis recommendations. Hourly employees and union representatives may participate.

Process Hazard Analyses are conducted by a multidisciplinary team that brings together both technical and practical experience. The team typically includes individuals with engineering, operations, and maintenance knowledge of ammonia refrigeration systems. At least one team member has direct experience with the specific process being evaluated, ensuring that the discussion reflects how the system actually operates in the field. In addition, the team includes a participant familiar with the selected PHA methodology to help guide the evaluation and maintain consistency in how hazards are identified and documented.

Items identified during the analysis are documented, evaluated, and assigned appropriate actions. A schedule is developed to track completion, with consideration given to the nature of the work, including whether items require a planned shutdown to safely implement. Recommendations are addressed within established timeframes, generally within 2.5 years or in accordance with a schedule agreed upon with the Mendocino County UPA. Final resolutions are documented, including what actions were taken and when they were completed. Relevant outcomes are communicated to affected personnel, including operations and maintenance staff, to ensure that changes are understood and incorporated into day-to-day activities.

The PHA is periodically reviewed and revalidated to ensure it remains aligned with the current configuration and operation of the system. This revalidation is conducted at least every five years by a team with similar qualifications to the original analysis. The review confirms that existing hazards, safeguards, and assumptions remain valid, and identifies any new risks introduced through changes in equipment, operations, or external conditions.

Noyo Harbor District shall retain all process hazard analysis for the life of the process. This includes the documented actions taken to address the findings and recommendations.

C. OPERATING PROCEDURES (40 CFR 68.69 / 19 CCR 5100.3)

Noyo Harbor District is developing written operating procedures for the covered ammonia refrigeration process in accordance with CalARP and RMP prevention program requirements. The procedures will address startup, normal operations, temporary operations, emergency operations, normal shutdown, emergency shutdown, and startup following a turnaround or emergency shutdown.

The procedures are being developed using manufacturer documentation, applicable IIAR standards, and recognized industry practices. A qualified refrigeration contractor is assisting in ensuring technical accuracy and consistency with the system's design and operating parameters. Upon completion, procedures will be implemented and personnel will be trained accordingly.

Operating Phases

The SOPs cover different phases of operations such as initial startup; normal, temporary, and emergency operations; emergency shutdowns; and startup following a shutdown. Various other safety programs and procedures are included.

Noyo Harbor District shall ensure that the operating procedures are developed and/or updated, as necessary to reflect current practice, or whenever the tasks or steps to perform on the covered process are found to be inadequate or inaccurate.

Operating Limits

The potential deviations that could be safety issues are pressures and temperatures outside safe limits. This is not likely to occur since system safeties will shut equipment down if pressures and temperatures are outside the set range. Pressure relief valves protect the system piping and vessels from excessive pressures.

Consequences of deviating from operating limits and procedural instructions are included in SOPs and in OEM manuals. In general, the following deviations include such items as:

<u>Pressure</u>
Exceeding 250 or 300 psig on the high side or equipment ratings on the low side of the system may result in 1) system or component shutdowns, 2) venting of pressure and ammonia through safety relief valves, or 3) component ruptures with a resulting ammonia release.

Excessively low pressures may result in 1) excessive energy consumption, 2) system or component shutdowns, and/or 3) premature equipment wear.

Steps to correct such deviations include startup of additional compressors, ensuring condensers are working properly, observing safe work practices such as not isolating liquid

ammonia without room for expansion, and training operators to run the system and equipment properly.

Vessel Liquid Level

Overfilling of vessels may result in 1) system or component shutdowns, 2) venting of pressure and ammonia through safety relief valves, or 3) compressor damages with a resulting ammonia release.

Low levels may result in 1) reduced ability to cool product, 2) pump cavitation and eventual overheating and seal damage, or 3) overheating of compressors.
Steps to correct such deviations include conducting regular rounds to ensure normal liquid level controls are functioning properly, maintaining levels alarms and cutouts in good working condition, and verifying function through regular tests, and training operators to run the system and equipment properly.

Temperature

Excessively high temperatures may result in 1) equipment damage including seal leakage, 2) loss of ability to chill product, or 3) high head pressures and eventual safety relief valve activation or equipment shutdowns.

Excessively low temperatures may result in 1) excessive energy consumption, 2) system or component shutdowns, 3) operating below the equipment's MDMT and/or 4) premature equipment wear.

Steps to correct such deviations include shutting down malfunctioning equipment, maintaining temperature alarms and cutouts in good working condition, and verifying function through regular tests, and training operators to run the system and equipment properly.

Oil Level

High compressor oil levels are not generally hazardous in systems with screw compressors with horizontal oil separators. Vertical separator high oil levels can cause compressor slugging; this is prevented with functional compressor check valves. Low levels will result in compressor shutdowns, compressor overheating and potentially seal damage and leaks.

Steps to correct such deviations include monitoring oil levels and pressures, maintaining oil temperature and pressure alarms and cutouts in good working condition and verifying function through regular tests.

Procedures

Failure to follow procedures may result in a broad range of consequences including catastrophic release or personal injury.

Steps to Avoid Deviations

Procedures to avoid deviations are documented in the SOPs and in specific equipment owner's manual troubleshooting sections. In general, operating the system within limits and following established procedures helps to avoid deviations. If there is any doubt as to whether the system can be run safely, it should be shut down.

Safety and Health Considerations

The facility has evaluated the safety and health considerations associated with the ammonia refrigeration system, with a focus on how employees may be exposed and how those risks are controlled. This includes an understanding of the physical and health hazards of anhydrous ammonia, particularly its toxicity, corrosivity, and behavior under pressure.

Controls are in place to minimize the potential for exposure. These include engineered safeguards such as system design, ventilation, and detection systems, as well as administrative controls like operating procedures, training, and restricted access to process areas. Personal protective equipment (PPE) is identified based on task-specific hazards and is available for use where required.

The program also addresses the actions to be taken in the event of exposure. This includes procedures for evacuation, first aid measures, and coordination with emergency responders. Employees are trained to recognize exposure symptoms and respond appropriately within the scope of the facility’s Emergency Action Plan.

Additional considerations include maintaining appropriate control over system materials and inventory levels to support safe operation. The facility also evaluates any unique or site-specific hazards that may not be typical of ammonia refrigeration systems, ensuring these are incorporated into procedures, training, and hazard evaluations.

Safety Systems and Their Functions

The refrigeration system is supported by a range of safety systems designed to prevent, detect, and mitigate abnormal conditions. These systems include pressure relief devices to protect against overpressure, ammonia detection systems to provide early warning of releases, and mechanical ventilation to reduce vapor accumulation.

Additional safeguards include compressor protection controls, liquid level controls on vessels, alarms to notify operators of abnormal conditions, and emergency shutdown devices to allow for rapid isolation of equipment. Together, these systems provide multiple layers of

protection and are intended to work in combination to support safe and reliable operation of the process.

Operating Procedures – Access and Maintenance

Formal written operating procedures for the refrigeration system are currently in development and have not yet been fully implemented. In the interim, the facility relies on the experience of the refrigeration contractor, along with available system information and manufacturer documentation, to support safe operation and maintenance activities.

The facility is in the process of developing procedures that will address normal operations, startup, shutdown, and response to abnormal conditions. These procedures will be made readily accessible to employees who operate or maintain the process and will be incorporated into training and daily operations once completed.

As procedures are finalized, the facility will implement a process to review and update them as necessary to reflect current operating practices, including changes to equipment, system configuration, and operating conditions. An annual review will be conducted to ensure procedures remain accurate and up to date.

Safe Work Practices

Formal written safe work practices have not yet been fully developed or implemented for the refrigeration system. In the interim, the facility relies on the refrigeration contractor to perform work in accordance with generally accepted industry practices and applicable safety requirements.

Activities involving higher-risk tasks—such as lockout/tagout, confined space entry, and opening of process equipment—are currently managed through direct oversight, coordination with contractors, and adherence to applicable regulatory requirements. Work is performed with an emphasis on hazard recognition, communication, and maintaining safe conditions during maintenance and non-routine activities.

The facility is in the process of developing and implementing formal safe work practices to address these activities. These procedures will establish consistent requirements for controlling hazards during maintenance and operational tasks and will apply to both facility employees and contractor personnel. Once implemented, these practices will be incorporated into training and routine operations to ensure a consistent and documented approach to safe work.

D. TRAINING (40 CFR 68.71 / 19 CCR 5100.4)

Noyo Harbor District provides training for personnel who perform or support daily monitoring (daily rounds) of the ammonia refrigeration system. Training addresses ammonia hazards, the purpose and scope of the daily round's procedure, recognition of abnormal operating conditions (e.g., odors, visible vapor, abnormal pressures/temperatures, unusual vibration or noise), and required actions including shutdown/notification steps and emergency communications.

Initial training is completed before personnel are assigned responsibility for conducting daily rounds or performing any covered-process-related duties. **Refresher training** is provided at least every 3 years to ensure continued understanding of ammonia hazards and the daily rounds procedure, and whenever procedures are revised, equipment changes occur that affect the rounds, or performance indicates the need for additional training. Training completion is documented and maintained in facility records.

Because the facility is non-responding, employees are instructed to not attempt defensive leak response activities and to follow the facility's emergency action and notification procedures (evacuate, isolate/deny entry if safe to do so, and contact emergency responders and the refrigeration contractor as applicable).

Technical service and maintenance activities beyond daily rounds are performed by qualified refrigeration contractors under their own training programs and procedures.

E. MECHANICAL INTEGRITY (40 CFR 68.73 / 19 CCR 5100.5)

Noyo Harbor District has established a mechanical integrity program for the ammonia refrigeration system and associated equipment to support safe and reliable operation. The program applies to key system components, including compressors, condensers, evaporators, pressure vessels (such as receivers, accumulators, and recirculators), piping systems, valves, pressure relief devices, and control and safety systems.

The program is intended to ensure that this equipment is maintained, inspected, and tested in a manner consistent with applicable industry practices, supporting continued system integrity and safe operation over time.

Written Procedures

Noyo Harbor District, with assistance from the refrigeration contractor, developed written mechanical integrity procedures for the system's equipment and appurtenances. The maintenance procedures are accessible to all Noyo Harbor District employees and contractors associated with or involved in the operations and maintenance of the process.

Employee and Contractor Training

The refrigeration system is primarily maintained by a refrigeration contractor. Personnel that routinely monitor the refrigeration system receive training in an overview of the refrigeration process and its hazards, and in the procedures applicable to the operator's job tasks to ensure that he or she can perform the tasks in a safe manner. Currently, maintenance training generally consists of on-the-job training, on a verbal basis, with frequent reference to equipment operation and maintenance manuals.

Noyo Harbor District has contracted a licensed refrigeration service and installation contractor, to perform any required maintenance on their ammonia refrigeration system. Contractors ensure that their employees are trained to perform the maintenance procedures developed.

Inspections and Tests

The maintenance schedule identifies the required type of inspections and tests consistent with recognized and generally accepted good engineering practices and application frequency consistent with applicable manufacturers' recommendations and good engineering practices for the system equipment and appurtenances.

Compressor temperature and pressure readings are logged on a regular basis. The following are additional items that are regularly monitored or recommended to be added:

- Pressure / Temperature
- Vessel and oil levels
- Visual inspection of valves and flanges
- Diffusion tank pH
- Unusual system noises, smells, etc.

All inspection and testing are completed by a refrigeration contractor. All documentation is kept on file at the facility.

The annual and 5-year inspection generally includes the following: inspection of compressors including testing of the safety cut-outs (annual), all refrigeration piping, general operations, liquid ammonia pumps, condenser water sump strainer and pump, evaporator fans, fan belts on the condenser, eliminators, water fill system, oil pot, ammonia detection equipment, and work areas.

Where inspection, testing, and maintenance (ITM) is performed on a calendar basis in lieu of a runtime basis, the following IIAR 6 calendar basis frequencies shall be followed:

Period	Calendar Basis	Runtime Basis (hours)
Daily	Occurring once per 24 hours.	24
Weekly	Occurring once per calendar week.	168
Monthly	Occurring once per calendar month.	730
Quarterly	Occurring four times per year. The minimum period between ITM tasks is 2 months. The maximum is 4 months.	2,190
Semiannual	Occurring twice per 12 consecutive months. The minimum period between ITM tasks is 4 months. The maximum is 8 months.	4,380
Annual	Occurring once per year. The minimum period between ITM tasks is 9 months. The maximum is 15 months.	8,760
Biennial (Two Years)	Occurring once every other year. The minimum period between ITM tasks is 21 months. The maximum is 27 months.	17,520
Three Years	Occurring once every 36 months. The minimum period between ITM tasks is 30 months. The maximum is 42 months.	26,280
Five Years	Occurring once every 60 months. The minimum period between ITM tasks is 54 months. The maximum is 66 months.	43,800
Ten Years	Occurring once every 120 months. The minimum period between ITM tasks is 108 months. The maximum is 132 months.	87,600

Often, more than one good engineering practice will apply to frequencies and acceptance criteria for inspection, testing, and maintenance (ITM) tasks. In these cases, the following order of preference may be used to determine which practice should be followed:

1. State / federal / local law or regulation
2. Manufacturer's recommendations
3. Industry codes and standards; IIAR
4. Company equipment history
5. Industry equipment history
6. Insurance company standards and guidance

Noyo Harbor District may increase recommended inspection and test frequency based on prior operating experience. More frequent inspections and maintenance will be implemented if determined necessary, often in consultation with a qualified refrigeration contractor. The schedule will be modified as required to reflect any changes in the type and frequency of testing, inspections, and preventive maintenance activities.

Less frequent inspections may result from the application of predictive maintenance methods. These methods may include procedures such as thermography and vibration testing for providing equipment conditions and a basis for adjusting the frequency of inspections.

The completed work order provides a certification record of each inspection and test that has been performed on process equipment. The work order identifies the date of the inspection or test, the name of the person who performed the inspection or test, the serial number or other identifier of the equipment on which the inspection or test was performed, a description of the inspection or test performed, and the results of the inspection or test.

Noyo Harbor District has adopted ANSI/IIAR 6, *Standard for Inspection, Testing, and Maintenance of Closed-Circuit Ammonia Refrigeration Systems*. At a minimum, the documentation for this program must be kept in line with ANSI/IIAR 6.

Type of Record	Retention Duration
Daily Inspection Records	Most current 12 months.
Daily Testing Records	Most current 12 months.
Daily Maintenance Records	Most current 12 months.
Annual Inspection Records	Most current 5 years.
Annual Testing Records	Most current 5 years.
Annual Maintenance Records	Most current 5 years.
Five Year Inspection Records	Two (2) most current.
Five Year Testing Records	Two (2) most current.
Five Year Maintenance Records	Two (2) most current.
Ten Year Maintenance Records	Two (2) most current.
Engineering design documentation	Life of the process.
Pressure vessel U1, U-1A, U-3, UM reports	Equipment life.
Log (Operator Transfer of Information)	Most current 12 months.
Secondary Coolant Records	Most current 12 months.
Ammonia Refrigerant Records	Most current 5 years.
Refrigeration Oil Records	Most current 5 years.
Lubrication Records	Most current 5 years.
Pressure Relief Valve (PRV) Records	PRV life.
Current System Records listed in Section 5.3.3	Life of the process.
Instrument and device testing and calibration	Most current 5 years.

Equipment deficiencies

Noyo Harbor District provides a process for identifying and addressing equipment deficiencies associated with the ammonia refrigeration system. Potential issues are identified by personnel during routine operations, maintenance activities, or observations in the field and are communicated to the refrigeration contractor for evaluation and corrective action.

Deficiencies are addressed based on their nature and potential impact to safe operation. Where applicable, corrective actions are documented and tracked through the refrigeration

contractor's work management process. Equipment requiring repair or replacement is evaluated to ensure that it is returned to service in a safe and reliable condition.

Quality Assurance

The Noyo Harbor District mechanical integrity program provides the following quality assurance activities:

In the design, acquisition, and construction of new or modification of existing plants and equipment not considered a replacement in kind, Noyo Harbor District requires the vendor certify these items are suitable for the process application for which they may be used. Typical replacement or maintenance parts suitable for the intended use are shown in the Materials of Construction section and in the Process Safety Information element.

Approval of the engineering design basis for new equipment and system modifications are managed by the Management of Change element. Oversight of fabrication, purchasing and installation of equipment is the responsibility of the refrigeration contractor, Harbormaster, and/or their designee.

Quality Assurance evaluations of engineering design, fabrication and installation of new equipment and system components ensure the following:

- Fabrication must be conducted in accordance with identified applicable good engineering practices. When required by applicable state laws, stamps, or approvals by registered professional engineers must be obtained.
- Physical inspections shall be conducted by the refrigeration operator/technician or his/her designee onsite after delivery. Results of these inspections will be documented as part of the Prestart-up Safety Review.
- Appropriate checks and inspections shall be conducted by the VP of Engineering, Maintenance Manager, refrigeration operator/technician, outside contractor, or his/her designee to assure that equipment is installed properly and consistent with design specifications and the manufacturer's instructions. Results of these inspections will be documented as part of the Prestart-up Safety Review.

Used Equipment

If the engineering project involves used equipment, the following activities are performed and documented:

- If available, the equipment history for the used equipment shall be obtained and incorporated into the Process Safety Information files.
- The used equipment shall be physically inspected to ensure that the equipment is fit for service in the new application installed properly and consistent with design specifications and the manufacturer's instructions. Results of these inspections will be documented as part of the Prestart-up Safety Review.

- The used equipment shall be subjected to appropriate engineering analysis to ensure that its original design basis will accommodate the anticipated service conditions of the new application, including abnormal, upset, and emergency conditions. Results of this analysis will be documented as part of the Prestart-up Safety Review.
- If possible, the used equipment will be tested before installation to confirm the engineering analysis and replicate the service conditions of the new application. Any tests required to restart the system must be performed in accordance with established pre-commissioning methods.

F. MANAGEMENT OF CHANGE (40 CFR 68.75 / 19 CCR 5100.6)

Changes to the Noyo Harbor District refrigeration system are evitable at some point during the lifetime of the facility and/or process. The Management of Change (MOC) procedure requires that all changes even “replacement in kind” be reviewed since changes have the potential to compromise existing safeguards and could have potentially catastrophic results. The MOC review addresses the technical basis for the change, the impact on safety and health, modifications to operating procedures, and authorization requirements for the proposed change.

Types of changes covered by MOC procedures include the following:

- Changes to plant layout, including changes in access roads and exit routes; and siting of employee populations, offices, break rooms, or facility HVAC systems.
- New ammonia system construction, or installation of new machinery or additional machinery rooms.
- Decommissioning of ammonia equipment
- Changes in system or component construction materials
- Replacement of equipment or components, piping, instruments, or electrical components that are not “in-kind” replacements.
- Changes to associated systems such as electrical, alarm system, detection system, computer controllers, emergency back-up system, power supply system.
- Changes to safety alarm settings, interlocks, system or equipment trips, or in the testing or calibration frequency for those devices.
- Temporary modifications and connections including pipe clamps, temporary pipe, hoses, temporary utility connections and temporary electrical equipment or connections.
- Modifications to existing equipment
- Piping modifications
- Installation of a control system
- A change in process variables, such as a significant increase or decrease in flow, temperature, or pressure. For example, the established operating limits for a

specific piece of equipment are 0 – 25 psig. It is desired to operate the equipment at 50 psig to obtain higher temperatures in the refrigeration system. Since the desired operating pressure (50 psig) is outside the established limits, this would constitute a change.

- Changes in standard operating procedures, or maintenance procedures
- An increase in ammonia inventory
- Changes to inspection and testing procedures and frequencies

Keep in mind that the above list is not necessarily complete. If in doubt, contact the responsible supervisor listed in the Management Program.

Initiation of Management of Change Form

The first step in the Management of Change procedure is the identification of the need for change and the initiation of an MOC. Part 1 of the MOC Form should be completed by the individual originating the request. The MOC should be forwarded to Harbormaster for review and approval.

Screening of Management of Change Form

The individual receiving a MOC has the initial responsibility for reviewing the request. This initial screening of the MOC has two objectives. The first is to identify which modifications are changes. The individual receiving a MOC should review it to determine whether the modification being requested falls within the definition of a change and if so, classify the change as “major”, “minor,” or “replacement in kind.”

A major change is any modification to the process, equipment, chemicals, technology, or procedures that could affect the safety, health, or environmental risk of the system. These changes introduce new hazards, increase existing risk, or alter how the system is designed or operated. Major changes require full Management of Change (MOC) review, including hazard evaluation, updates to process safety information, procedures, and training, as applicable.

Examples:

- Installing new equipment or replacing equipment with different design / specifications
- Changing refrigerant type or introducing new chemicals
- Modifying system pressures, temperatures, or capacities beyond original design
- Changes that affect ventilation, detection, or safety systems
- Significant control system or logic changes

A minor change is a modification that does not significantly impact process safety, does not introduce new hazards, and does not change the intended design or operation of the system. These changes are typically routine, low-risk adjustments that can be managed through

standard work practices. Minor changes do not require a full MOC but should still be reviewed to ensure they remain within safe operating limits and do not unintentionally affect system performance.

Examples:

- Adjusting setpoints within established safe operating ranges
- Replacing small components with equivalent parts that do not affect system design
- Minor instrumentation adjustments or calibration changes
- Administrative updates that do not affect how the process operates

Replacement in Kind refers to the substitution of equipment, components, or materials with items that are the same or equivalent in design, specifications, and performance. These replacements do not introduce new hazards or change how the system operates. Because the replacement maintains the original design intent, it is not considered a change under MOC requirements, provided equivalency is verified.

Examples:

- Replacing a valve, gasket, or motor with the same model or equivalent specification
- Replacing a pressure gauge with the same range and accuracy
- Swapping like-for-like piping components or fittings
- Replacing a compressor component with manufacturer-approved equivalent parts

Managing Temporary Changes

The Harbormaster will verify the duration of the change, whether temporary or permanent, establish a duration, and authorize temporary changes after evaluating the safety, health and operational implications.

Adequate safeguards, either procedural or consisting of installed hardware, are provided to safely operate under a temporary change. Since more emphasis may be placed on procedural safeguards for temporary changes, closer scrutiny may be added for temporary changes to help ensure the modification does not represent an unacceptable risk.

Noyo Harbor District manages temporary changes by developing operating procedures with the assistance from the refrigeration contractor to ensure safe operation during the temporary change period, verifying that the system has been restored to its original operating condition, once the time authorized for the temporary change has expired, and, initiating the MOC process if it is determined that the temporary change will become permanent.

Preliminary Engineering

An outside contractor will handle the design and engineering of a change. Any design recommendations raised at the time of the review will be addressed during the preliminary

engineering. When preliminary engineering is sufficiently complete, the design should be submitted to the Harbormaster, or other designee for a safety and health review and if required, a process hazard analysis.

Safety and Health Review

After the preliminary engineering has been completed, a safety and health review of the change is conducted by using the safety review checklist.

The Harbormaster should be responsible for ensuring the safety and health review is completed and documented with input from other departments and disciplines as needed.

Notify and train employees and contractors

Management of Change will require development of, or modification to, many documents. Any such documents that will be affected need to be identified early in the change process. Prior to start-up, these documents should be annotated or updated, and all personnel informed and trained about these changes.

Prior to starting up any modified facility, all necessary personnel should be informed of the change and of the consequences of the change. Any orientation or training on the modified facility and/or modified procedures should be completed before starting. The Harbormaster should be responsible for ensuring that this communication of a change and training has been accomplished.

The Change Is Implemented

The Harbormaster and/or designee will sign the MOC indicating approval to proceed with start-up of the modification.

A pre-startup safety review should be conducted for the modifications to the ammonia refrigeration system prior to startup of the modified system. The review involves an inspection and technical review to ensure that the modification has been installed in accordance with the approved design standards, that procedures are in place and adequate, and that training of operating personnel has been completed.

G. PRE-STARTUP SAFETY REVIEW (40 CFR 68.77 / 19 CCR 5100.7)

Noyo Harbor District performs a pre-startup safety review (PSSR) for new stationary sources and for modifications that are significant enough to require updates to process safety information. The purpose of the PSSR is to provide a final verification, independent of the management of change process, that the system is ready for safe startup prior to the introduction of regulated substances.

The review confirms that construction and equipment are consistent with design specifications, that appropriate procedures are in place, and that required hazard evaluations and training have been completed. For new installations, this includes verification that a process hazard analysis (PHA) has been conducted and that recommendations have been addressed. For modified systems, the review confirms that applicable management of change (MOC) requirements have been completed.

The PSSR is documented using a standardized review form. The form is used to verify completion of key items such as process safety information, MOC and PHA activities (as applicable), development and implementation of operating, maintenance, and emergency procedures, and completion of required training for affected personnel. The form also confirms that equipment has been installed in accordance with design requirements and that the system is ready for safe operation.

Signatures should be gathered after satisfactory completion of the listed requirement. Noyo Harbor District identifies the following titles that have the authority to sign off on the pre-startup safety review form. The titles include Harbormaster, Marina Manager, refrigeration contractor, or another designated Noyo Harbor District employee

Only after completion of the entire verification form should ammonia be introduced into the facility or affected equipment.

H. COMPLIANCE AUDIT (40 CFR 68.79 / 19 CCR 5100.6)

To ensure that all sections of the prevention program are up to date and followed, regulations require compliance audits. At a minimum, these must be completed every three years. At least one person involved in the audit is knowledgeable about the process. The auditor develops a report of the audit findings and Noyo Harbor District documents appropriate responses to each finding. Noyo Harbor District also documents those deficiencies that have been addressed. The two most recent audits are retained.

Since this is an initial submission, a compliance audit is not required to be completed. A compliance audit will be conducted 3 years from the date of program submission.

Audit findings and recommendations are directed at management to ensure that the recommendations are evaluated and resolved by the scheduled agreed upon timeline with the Mendocino County UPA. Outside of the agreed upon timeline, all compliance audit recommendations shall be addressed within 1.5 years. Actions taken to implement the recommendation and the actual date of completion shall be documented.

I. Third Party Audits (40 CFR 68.80)

As part of the 2022 amendments to the federal Risk Management Program (RMP) Rule—commonly referred to as the *Safer Communities by Chemical Accident Prevention (SCCAP)* rule—the U.S. Environmental Protection Agency (EPA) is introducing new requirements for third-party compliance audits at Program 2 facilities. These provisions become effective on May 10, 2027, and apply under specific triggering conditions. Noyo Harbor District has proactively included this section in its Risk Management Plan (RMP) to support early planning and ensure future compliance.

Applicability

A third-party compliance audit will be required if either of the following conditions occurs:

- Noyo Harbor District experiences a reportable accidental release of a regulated substance from a covered process, as defined in 40 CFR §68.42 and 68.130; or
- The implementing agency (CalEPA or UPA) determines that conditions at the facility could lead to a catastrophic release, based on inspections, incidents, or other credible evidence of noncompliance.

These audits are in addition to the facility's required internal compliance audits conducted at least once every three years.

Third-Party Auditor Requirements

When triggered, Noyo Harbor District will engage a qualified, independent third-party auditor or audit team that meets the following criteria:

- The auditor must be technically competent in Program 2 RMP elements and the specific processes involved at the facility;
- The auditor must be organizationally independent, having no ownership, financial, or employment relationship with Noyo Harbor District;
- The auditor must not have provided consulting services related to process safety or regulatory compliance to Noyo Harbor District within the past two years;
- The lead auditor must document relevant qualifications, certifications, and experience consistent with EPA expectations.

Auditor selection will be documented, and qualifications will be retained with the audit record.

Audit Scope and Requirements

The third-party audit must include:

- A comprehensive evaluation of each Program 2 prevention program element;
- On-site inspection(s) and employee interviews;
- A written audit report with detailed findings, including:
    - Areas of noncompliance;

- Recommended corrective actions;
- Timeframes for resolution;
- Certification by the lead auditor.

A copy of the completed third-party audit report will be retained on site for at least five years and made available to the implementing agency upon request.

Corrective Actions and Documentation

Noyo Harbor District will promptly evaluate each audit finding, determine and implement appropriate corrective actions, and document both the actions taken and the date of completion. All findings will be tracked to closure using the facility's corrective action tracking system.

The facility will also prepare a follow-up report demonstrating that each item was resolved in accordance with the audit findings and regulatory expectations. This follow-up documentation will be maintained with the audit record and available for regulatory review.

Program Integration and Continuous Improvement

Although Noyo Harbor District is not currently subject to a third-party audit trigger, this section has been incorporated into the RMP in anticipation of the May 10, 2027 effective date. Internal procedures and audit protocols will continue to be reviewed and updated to ensure readiness should this requirement become applicable.

J. INCIDENT INVESTIGATION (40 CFR 68.81 / 19 CCR 5100.7)

An incident investigation shall be performed any time there is an incident which resulted in, or which could reasonably have resulted in, the release of ammonia. The purpose is to gain information that could prevent further accidents and to identify weaknesses in the emergency response plan that need to be addressed. Investigations are initiated promptly using a trained team. The findings and recommendations will be studied, and appropriate corrective action taken.

Incident Investigation Criteria

The following is a list of the criteria that will be used to help Noyo Harbor District employees determine whether an incident investigation should be performed. An incident meeting any one of the criteria should be investigated.

- Release of more than one hundred pounds (100 lb.), corresponding to the RQ for anhydrous ammonia
- Employee(s) exposed to more than the CalOSHA permissible exposure limit of 25 PPM
- Significant product loss or damage to system or facility

- Fire / Explosion
- Injury or death
- Failure of safety equipment
- Plant evacuation
- Trip of stationary detector
- “Near Miss”

Establish an Investigation Team

Timing is of the essence in starting the investigation. The team shall begin its investigation into each incident within 48 hours following the incident. The VP is responsible for selecting the members of the incident investigation team. A team leader will be appointed. The exact membership of the Team will be dependent upon severity and circumstances surrounding the incident.

Collect and Analyze Information

A prompt and comprehensive search for facts surrounding the incident is the first major undertaking of the Team.

Team members should visit the incident scene before physical evidence has been disturbed. The Team should take brief statements from any eyewitnesses who are available during the inspection. Team members should review the scene, discuss their preliminary findings, and prepare a written log of observations and important comments.

It is also important that the true “root” cause of the incident, as well as contributing causes be identified.

Written Report

During the “determination of the cause” process, some actions may surface that could have eliminated or reduced the chances for the incident having occurred. In some cases, these recommendations may not relate to the most likely cause but may still be an appropriate recommendation to improve the safety of the process.

The Team should formalize these recommendations in two distinct areas. Engineering changes should encompass those actions that include physical changes to the system hardware. Administrative changes should include procedural changes, training, etc.

Communicate Results

Communicating results fall into two distinct areas.

- First is the completion of the standard Incident Investigation Report Form that should be used in all cases involving an ammonia incident.

- Second is the requirement that the results of the investigation be reviewed with appropriate personnel whose work assignments were affected or could have been affected by the incident or one like it.

Upon completion of the investigation, the Team Leader should arrange for one or more review sessions with affected employees. The purpose of the meeting is to explain the outcome of the investigation. The Team, as part of its work, should have developed a list of affected individuals (by name or job description) who should be involved in the review process. The Team should consider incident circumstances in determining who the “affected employees” are.

Resolve Findings

Noyo Harbor District has established a system to promptly address and resolve the incident report findings and recommendations. Noyo Harbor District shall resolve the recommendations within 1.5 years after the completion of the investigation, or 2 years after the date of the incident, whichever is the earlier of the two dates. If these timelines cannot be met, Noyo Harbor District shall enter into an agreement with Mendocino County UPA (UPA) on a timetable for resolution of any findings and/or recommendations.

Document Retention

All incident investigations will be maintained for 5 years and are accessible in the office.

K. EMPLOYEE PARTICIPATION (40 CFR 68.83 / 19 CCR 5100.10)

Noyo Harbor District maintains an employee participation approach that reflects the size and structure of the facility while supporting implementation of the prevention program. Due to the limited number of personnel involved in the ammonia refrigeration system, participation is direct and integrated into day-to-day operations, maintenance coordination, and program development activities.

The primary operator, along with supporting personnel, is actively involved in the development, review, and implementation of Program 3 elements. This includes providing input based on operational experience, identifying potential hazards, and supporting communication between the facility and the refrigeration contractor.

Employee participation occurs across the prevention program elements as follows:

- **Process Hazard Analysis (PHA):** Personnel with direct knowledge of the system participate in hazard evaluations, providing input on system operation, past issues, and practical safeguards.

- **Process Safety Information (PSI):** Employees support the development and verification of system information, including equipment identification and general system understanding.
- **Operating Procedures:** Refrigeration contractors provide input on how the system is operated in practice and will be involved in the development and review of procedures as they are implemented.
- **Training:** Employees participate in training activities and provide feedback to ensure training reflects actual system operation and responsibilities.
- **Mechanical Integrity:** Personnel support routine observation of equipment condition and communicate any concerns to the refrigeration contractor for follow-up.
- **Management of Change (MOC):** Employees are involved in identifying proposed changes and providing input on how those changes may impact system operation and safety.
- **Incident Investigation:** Personnel participate in reviews of any incidents or near-misses to help identify causes and corrective actions.
- **Compliance Audits:** Employees support audit activities by providing information related to system operation and program implementation.

Given the size of the facility, communication is direct and ongoing, allowing employees to provide input and raise concerns without formal processes. This approach supports timely identification of issues and continuous improvement of the prevention program.

Process safety information, including elements of the prevention program, is available to employees for review. Information is maintained in an accessible format, and employees may request access to relevant documentation to support their understanding of the system and associated safety requirements.

L. HOT WORK (40 CFR 68.85 / 19 CCR 5100.11)

Noyo Harbor District has established a hot work permit process to control hazards associated with activities that may introduce ignition sources, such as welding, cutting, grinding, or other spark-producing work conducted on or near the ammonia refrigeration system.

Hot work is authorized through a permit issued prior to the start of work. The permit process includes evaluation of the work area to confirm that appropriate precautions are in place, such as removal or protection of combustible materials, verification of safe atmospheric conditions, and identification of fire prevention measures. Where applicable, fire watch requirements and duration are defined to ensure continued monitoring during and after completion of the work.

Hot work activities are coordinated with facility personnel and, as applicable, the refrigeration contractor to ensure that system conditions are understood and that work is performed safely. The permit is completed for each applicable task and maintained on-site for documentation purposes.

Completed hot work permits are retained for a minimum of three (3) years in accordance with the RMP program requirements.

M. CONTRACTOR SAFETY (40 CFR 68.87 / 19 CCR 5100.12)

Noyo Harbor District utilizes qualified contractors to perform work that may impact the safety of the ammonia refrigeration system. Contractors are selected based on their ability to perform work safely, including consideration of their safety programs, training practices, and overall safety performance. The qualification process is intended to ensure that contractors understand the hazards associated with ammonia refrigeration systems and can perform work in a safe and compliant manner.

Noyo Harbor District Responsibilities

Noyo Harbor District informs contractors of the known hazards associated with the ammonia refrigeration system, including potential fire, explosion, and toxic release hazards relevant to the work being performed. Contractors are also provided with information related to the facility's Emergency Action Plan, including expected actions in the event of an emergency.

The facility communicates applicable safety rules and expectations to contractors and maintains oversight of contractor activities while on-site. This includes controlling contractor access to the refrigeration system and ensuring that work is coordinated to maintain safe operating conditions.
As part of the contractor selection and oversight process, Noyo Harbor District evaluates contractor safety performance and reviews relevant safety information, including injury and illness data related to the work being performed. Contractor performance may be periodically reviewed to confirm that expectations are being met.

Contractor Responsibilities

Contractors are responsible for ensuring that their employees are properly trained and qualified to safely perform their assigned work. Contractor personnel are expected to follow all applicable safety rules and work practices while on-site at Noyo Harbor District.
Contractors ensure that their employees are informed of the hazards associated with their work and the ammonia refrigeration system, as well as the applicable provisions of the facility's Emergency Action Plan. Contractors maintain documentation of employee

training, including employee identification, training dates, and methods used to verify understanding.

Contractors are also responsible for communicating any hazards associated with their work activities, including any unique hazards introduced or identified during work, to Noyo Harbor District.

VI. EMERGENCY RESPONSE PROGRAM (40 CFR 68: Subpart E / 19 CCR CalARP: Article 8)

A. EMERGENCY RESPONSE PROGRAM (40 CFR 68.95 / 19 CCR 5120.2)

Noyo Harbor District Emergency Action Plan provides procedures for employee emergency evacuation. The EAP describes alarm systems and warnings, types of evacuation, emergency escape procedures, emergency escape routes and assembly locations, procedures for accounting for employees, points of contact for reporting releases, and notification procedures.

The plan includes how to handle incidental releases of hazardous materials, such as ammonia. This plan includes the release reporting procedures and contact information, identifies the team members, and describes training required for the team members. The plan identifies the facility positions that are responsible for implementation.

Another part of the plan involves annual coordination with local emergency response agencies. Coordination involves how the facility is addressed in the community response plan and ensure agencies are knowledgeable of the substances stored at the facility. Noyo Harbor District shall share the plan with the appropriate response agencies.

Noyo Harbor District need not comply with §68.95 provided they can demonstrate the following requirements:

> For stationary sources with any regulated toxic substance held in a process above the threshold quantity, they are included in the community emergency response plan developed under 42 U.S.C. 11003;
>
> Appropriate mechanisms are in place to notify emergency responders when there is a need for a response, including providing timely data and information detailing the current understanding and best estimates of the nature of the accidental release. Noyo Harbor District may satisfy the requirement through notification mechanisms designed to meet other Federal, State, or local notification requirements, provided the notification meets the requirements of this paragraph as appropriate.

Noyo Harbor District performs the annual emergency response coordination activities required under §68.93 (detailed below);

Noyo Harbor District performs the annual notification exercises detailed below); and

Noyo Harbor District maintains and implements, as necessary, procedures for informing the public and the appropriate Federal, State, and local emergency response agencies about accidental releases and partnering with these response agencies to ensure that a community notification system is in place to warn the public within the area potentially threatened by the accidental release. Documentation of the partnership shall be maintained.

The following provides a summary of the coordination and notification requirements discussed above.

Coordination shall occur at least annually, and more frequently, if necessary, to address changes: At the facility, in the emergency action plan and/or in the community emergency response plan.

Coordination shall include providing to the local emergency planning and response organizations: The Noyo Harbor District plan, updated emergency contact information, and other information necessary for developing and implementing the local emergency response plan.

Noyo Harbor District shall document coordination with local authorities, including: The names of individuals involved and their contact information (phone number, email address, and organizational affiliations); dates of coordination activities; and nature of coordination activities.

To meet the requirements of §68.96, Noyo Harbor District shall conduct an exercise of the notification mechanisms identified in the plan on an annual basis. This can be included in the required annual evacuation drill.

VII. OTHER REQUIREMENTS (40 CFR 68: Subpart H / 19 CCR CalARP: Article 10)

A. RECORD KEEPING (40 CFR 68.200 / 19 CCR 5140.1)

Noyo Harbor District retains CalARP implementation records for a minimum of five years, unless a longer retention period is specified within the applicable prevention program requirements.

B. AUDITS (19 CCR 5140.2)

The CalARP and RMP programs are performance-based regulations, requiring owners and operators to take an active role in developing, implementing, and maintaining a compliant program tailored to the specific hazards and operations at the facility. Noyo Harbor District must recognize that ongoing compliance is not achieved through static documentation but through continual evaluation, employee engagement, routine verification of procedures, and proactive hazard management. As such, the facility must be committed to maintaining a dynamic and responsive program that meets regulatory expectations and ensures the safety of personnel, the community, and the environment.

To ensure this commitment is recognized, the UPA shall inspect Noyo Harbor District at least once every three years to determine whether they are following the CalARP regulatory sections.

In addition to inspections for the purpose of regulatory development and enforcement, the UPA shall periodically audit RMPs to review the adequacy of such RMPs and require revisions to RMPs when necessary to ensure compliance with this chapter. To the extent possible, any audit shall be fully coordinated with the Unified Program elements at Noyo Harbor District.

They shall select stationary sources for audits based on any of the following criteria:

- Accident history of the stationary source;
- Accident history of other stationary sources in the same industry;
- Quantity of regulated substances present at the stationary source;
- Location of the stationary source and its proximity to the public and environmental receptors;
- The presence of specific regulated substances;
- The hazards identified in the RMP; and,
- A plan providing for neutral, random oversight.

Note: A stationary source with a Star or Merit ranking under OSHA's voluntary protection program shall be exempt from audits.

Noyo Harbor District shall provide UPA access to the facility, supporting documentation, and any area where an accidental release could occur.

Based on the audit, the UPA may issue Noyo Harbor District with a written preliminary determination of necessary revisions to their RMP to ensure that the RMP complies with the requirements. The preliminary determination shall include an explanation for the basis for the revisions, reflecting industry standards and guidelines to the extent that such standards and guidelines are applicable, and shall include a timetable for their implementation.

Noyo Harbor District shall respond in writing to a preliminary determination. The response shall state that Noyo Harbor District will implement the revisions contained in the preliminary determination in accordance with the timetable included in the preliminary determination or shall state that they reject the revisions in whole or in part. For each rejected revision, Noyo Harbor District shall explain the basis for rejecting such revision, such explanation may include substitute revisions.

The written response shall be received by the UPA within 90 days of the issue of the preliminary determination or a shorter period as the UPA specifies in the preliminary determination as necessary to protect public health and the environment. Prior to the written response being due and upon written request from the owner or operator, the UPA may provide in writing additional time for the response to be received.
After providing Noyo Harbor District an opportunity to respond, the UPA may issue Noyo Harbor District a written final determination of necessary revisions to the RMP. A timetable for implementing these revisions shall be developed in consultation with Noyo Harbor District Revisions must be completed as soon as practicable, but no later than one year after the final determination has been issued unless the UPA agrees, in writing, upon a timetable before the resolution becomes overdue.

The final determination may adopt or modify the revisions contained in the preliminary determination or may adopt or modify the substitute revisions. A final determination that adopts a revision rejected shall include an explanation of the basis for the revision. A final determination that does not adopt the substitute revision provided shall include an explanation of the basis for finding such substitute revision unreasonable.

Noyo Harbor District shall document the actual completion dates when deficiencies were corrected. The public shall have access to the preliminary determinations, responses, and final determinations.

2026 Hazard Review
Ice Maker Ammonia Refrigeration System

Prepared for:

19101 S. Harbor Drive
Fort Bragg, CA 95437

Prepared By:

Apcco Compliance
Modesto, CA

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APCCO

APCCO services the industry in refrigeration design, construction, service, parts, and regulatory compliance. Established in 1981, APCCO has distinguished itself with customer satisfaction, honesty, and leadership. The mission is to support our customers' needs for refrigeration solutions, serving them with the same pride, care, and concern for quality that they exhibit towards their customers. Continue to build upon an outstanding reputation and trust of many satisfied customers.

For the purposes of this report, APCCO has assumed that the information provided by Noyo Harbor District which forms the basis of this analysis is accurate, representative, and suitable to produce a hazard review compliant with regulatory requirements.

1 Management Summary

1.1 Overview

This report documents the findings of the combined What-if & Checklist hazard review conducted for Noyo Harbor District covering the one ammonia refrigeration system at the Fort Bragg, CA facility. The analysis was conducted at the facility on February 5, 2025.

Apcco was contracted to perform this hazard review by Noyo Harbor District. Michelle Schlefstein acted as team leader for the study. Ms. Schlefstein has facilitated numerous PHAs in refrigeration plants, co-generation and NOx reduction processes and chemical plants. In addition, Ms. Schlefstein was employed as an Environmental, Health and Safety Manger which included overseeing the implementation of the PSM/RMP for 16 years. Following the time at an end user facility, Ms. Schlefstein has been employed as a consultant for over 8 years.

Apcco facilitated the study with a team from Noyo Harbor District management and the servicing contractor.

1.2 Summary of Analysis

This hazard review was conducted as an initial evaluation of the ammonia refrigeration system to identify potential hazards, assess existing safeguards, and determine whether additional controls are needed to reduce risk. The analysis reflects the system configuration, operating practices, and management approach in place at the time of the review. Each refrigeration system was evaluated individually based on its specific configuration and operation; however, the findings and recommendations are presented together in this report for completeness and ease of reference.

The hazard review team evaluated the refrigeration system by systematically identifying credible release scenarios, abnormal operating conditions, and external events that could affect system safety. The review considered equipment design and condition, operating practices, maintenance activities, human factors, and emergency response considerations. Applicable industry practices and manufacturer guidance were used as references during the analysis.

As part of the review, available operating history and relevant industry incidents were evaluated to identify lessons learned and scenarios that warranted consideration in the hazard analysis. Preventive maintenance practices were also reviewed to confirm alignment with industry practices and manufacturer recommendations.

Existing engineering and administrative safeguards were evaluated for adequacy, and recommendations were developed where additional safeguards or procedural improvements were determined to be appropriate. Recommendations resulting from this hazard review are intended to support continuous improvement and provide a baseline for future reviews.

This initial hazard review establishes a documented foundation for managing process safety risks and will support future periodic reviews or updates as facility operations, equipment, or management practices evolve.

1.3 Key Findings and Results

The key findings and results from the hazard review include:

- The major risks of the ammonia refrigeration system have been identified and the safeguards to prevent release have been reviewed and/or evaluated.
- The list of recommendations from the What-if questions, and the Checklist includes safeguards which may help to prevent or minimize the chances of accidental release of ammonia occurring at Noyo Harbor District.

A checklist was used to analyze external events. The hazard review team determined that most external events have little likelihood of occurrence or a potential to create a release of ammonia.

Noyo Harbor District should document the corrective actions taken to address each team's recommendation. The corrective actions which may include supporting documentation, like training documentation, pictures, etc. should be included.

This report shall be kept for the life of the process, as required by program regulations.

The five-year anniversary date for the hazard review revalidation is **February 4, 2031,** as determined by this report, which serves as documentation of the completion of the hazard review.

2 Process Description

The facility operates a closed-loop, single-stage, automated ammonia refrigeration system designed to support the North Star ice maker. The system operates on the principle of latent heat absorption during vaporization and latent heat rejection during condensation. Ammonia circulates continuously through the system to absorb heat from the ice-making process and reject that heat to the atmosphere via an evaporative condenser.

High-pressure liquid ammonia is stored in the high-pressure receiver. From the receiver, liquid ammonia is supplied to the suction accumulator, which also functions as a flash cooler due to the internal cooling coil. Subcooled liquid ammonia from the suction accumulator is then supplied to the ice maker surge drum. A separate liquid line from the high-pressure receiver provides liquid injection for compressor oil cooling.

As liquid ammonia passes through the expansion device into the low-pressure side of the system, its pressure is reduced to evaporator pressure, resulting in partial flash vaporization. The surge drum supplies liquid ammonia by gravity to the North Star ice maker. Within the ice maker, low-pressure ammonia circulates through the shell side while water circulates on the opposite side of the heat exchange surface, allowing heat transfer that produces ice. The ice maker is defrosted using scheduled air defrost cycles.

Vapor-liquid phase separation occurs in the suction accumulator to ensure only dry vapor is returned to the compressor. The vessel is designed to capture and retain any entrained liquid ammonia carried over from the evaporator or surge drum, thereby preventing liquid slugging of the compressor. An internal heat exchange coil is installed within the suction accumulator to promote vaporization of any accumulated liquid ammonia. The coil provides controlled heat input to boil off retained liquid refrigerant, ensuring that vapor returned to the compressor remains in a dry, superheated state under normal operating conditions.

Low-pressure ammonia vapor exiting the suction accumulator is then compressed to a high-pressure, superheated vapor state and discharged to the evaporative condenser.

In the evaporative condenser, high-pressure vapor is first desuperheated and then condensed to high-pressure saturated liquid through heat rejection to water and air. Water is sprayed over the condenser coils while air is drawn counterflow across the wetted surface. Evaporation of the water enhances heat removal, allowing the ammonia

vapor to condense. The resulting high-pressure liquid drains by gravity back to the high-pressure receiver, completing the cycle.

All pressure relief valves protecting the ammonia refrigeration system are hard piped to a relief header that discharges to atmosphere at a designated termination point. The discharge piping is arranged to direct relief flow away from occupied areas and equipment in accordance with applicable refrigeration safety standards.

3 Study Methodology

A What-if analysis is a means to identify the potential hazards of a facility, evaluate the significance of the hazards, evaluate the adequacy of existing safeguards, and list preliminary recommendations to reduce or eliminate the likelihood or severity of the hazards. This hazard review technique is an OSHA and EPA hazard review approved method.

The What-If and Checklist technique was used for this hazard review study. There were several reasons for selecting the What-If technique. First, the technique is highly effective in situations where the system and hazards are well understood. For Noyo Harbor District's refrigeration system, there is a single main constituent (anhydrous ammonia) in a looped system. Analysis of the system demands merely a basic understanding of heat transfer, fluid flow, and phase change phenomena. With respect to process hazards, scenarios of interest invariably reduce the release of ammonia — a chemical with well understood and extensively documented impacts on human health and safety. Thus, a situation presented itself where both the system and the process hazards were easily understood.

In addition, the What-If technique enjoys wide acceptance among safety and risk practitioners and associated agencies. This includes written acknowledgment by IIAR, American Petroleum Institute (API), Center for Chemical Process Safety (CCPS), Chemical Manufacturers Association (CMA), OSHA and the EPA. Another important factor was the availability of data from a generic What-If. The generic data — which was reviewed, customized, and supplemented for this specific system — helped ensure the thoroughness and quality of this compliance targeting study.

3.1 Composition of Team

This what-if study was conducted by a team of individuals with knowledge of regulatory and industry requirements, engineering, safety, operations, and maintenance. It relied on the team to brainstorm potential hazard causing situations. The team was led by an individual with expertise in the what-if study technique.

The following is a snapshot of the sign-in sheet.

Process Hazard Analysis / Hazard Review

Trigger for PHA or Hazard Review and scope of work: initial hazard review

Name (Please Print)	Signature	Company	Title	Experience in Years & Disciplines	2/5/26
Michelle Schlefstein	Michelle S	APCCO	Team Leader: PSM Prog. & Training Specialist	16+yrs. EHS; 20+ yrs. RMP/PSM	MS
Anna Neumann		Noyo Harbor District	Harbormaster	4 maritime management	AN
Ron Fetterley		APCCO	Service Tech	10 years	2-6-26

4 Scope of Hazard review

4.1 Scope of Work

The scope of the study was limited to the single anhydrous ammonia process, and included:

1. Review of relevant P&IDs
2. Preparation for the what-if sessions
3. Provide an overview of the what-if method to the team members to ensure project consistency
4. Facilitate and document the what-if study with team members
5. Develop a list of action items for changes and improvements to the process, including potential operability improvements
6. Review of previous incidents
7. Provide a detailed report and summary of the study, including study discussions and documentation, to team members for review and comment
8. Incorporate team member comments into a final report

The process was divided into sub sections to focus on the analysis. To ensure a thorough and effective hazard review, the refrigeration system was divided into distinct equipment groupings based on function, physical location, or pressures / temperatures, etc. The equipment was placed in order by how the ammonia moves or is pumped through out the system starting at the high pressure receiver.

This approach allowed the team to focus on each section of the system in detail, ensuring that specific hazards and potential failure scenarios unique to each piece of equipment were adequately identified and evaluated. Equipment was grouped into logical sections allowing the analysis to proceed in a systematic manner. This segmentation helped prevent important details from being overlooked and facilitated a more manageable and comprehensive review of the refrigeration system’s hazards.

The sub sections studied are listed below.

TABLE A: HAZARD REVIEW SUBSECTIONS (WHAT-IF)	
Item No.	**Description or Type of Equipment**
1	High pressure receiver
2	Ice machine, Surge drum, Oil pot
3	Suction accumulator
4	Compressor, Oil separator
Pressure Relief Valves	Pressure relief valves (PRV) are installed on all ASME rated vessels. In every vessel section noted above there is a PRV section.
5	Condenser
6. Piping, Valves, and PRV (General)	The purpose of piping is to connect refrigeration equipment, vessels, and valves to form a closed loop system. Pipes containing low pressure ammonia are typically insulated, while pipes containing high pressure ammonia are painted. Under normal conditions, the piping can contain both high and low pressure liquid and vapor ammonia. The purpose of a valve is to provide the ability to isolate refrigeration system equipment, drain ammonia, purge ammonia, add additional ammonia to the system, to throttle flow to select system components, and maintain space temperatures. The PRV general section considers preventative maintenance, discharge location, and failure.
7. Facility Siting	This section assesses the potential consequences of known facility hazards.
8. Emergency Situation	This section documents facility procedures and policies regarding emergency situations.
9. Human Factors	This section considers sources of human error which may impact operation of the system.
10. Site Specific & Facility / Industry Incidents	This section is used to add any specific facility incidents and/or industry incidents that the PHA team deems applicable.
External Events (Checklist)	The checklist considers external events, including seismic events at the facility.

4.2 Safety Information

The safety information was used as a reference as part of this hazard review. Some basic safety system information is detailed below.

TABLE B: SAFETY SYSTEMS	
SAFETY SYSTEM	**COMMENTS**
Pressure relief valves on all ASME rated pressure vessels	Relieve to atmosphere
Compressor control panels to shut down the compressor operation if safe operating conditions are exceeded	Limit excess system conditions (high / low pressure or temperature; low oil pressure / temp / oil differential)
Liquid level float switches to control vessel ammonia levels	Maintain desired liquid ammonia level in low pressure receiver
High level vessel interlocks (discussed in next table)	Interlocked with compressors to shut off at high level
Spring-loaded, self-closing (“deadman”) oil drain valves	Prevent uncontrolled release of liquid ammonia during oil removal procedure
Critical isolation valves	King valve is located at the outlet of the high-pressure receiver. This valve can be closed to stop all flow of high-pressure liquid out into the system.
Manual isolation valves at vessels	Isolate vessel from system to perform maintenance or during a release

4.3 Past Accident History

Since initial charging and commissioning of the ammonia refrigeration system, there have been no ammonia-related incidents meeting reporting or investigation criteria available for review. The facility’s maximum ammonia inventory does not exceed the federal threshold quantity that would trigger applicability of the Process Safety Management (PSM) standard.

In conjunction with the development and implementation of the CalARP / RMP prevention program, the facility has established a formal incident investigation procedure. This process includes the use of a standardized investigation report form to document, evaluate, and track any future incidents or near-miss events, with the objective of identifying root causes and implementing corrective actions to prevent recurrence.

The hazard review team used past experiences and knowledge of accidents at other facilities as examples of potential accidents that could occur at this facility. These were discussed to reveal possible causes that might apply to future accidents at this facility and to recommend appropriate mitigation procedures. A summary of chemical accidents that were reviewed during the hazard review include:

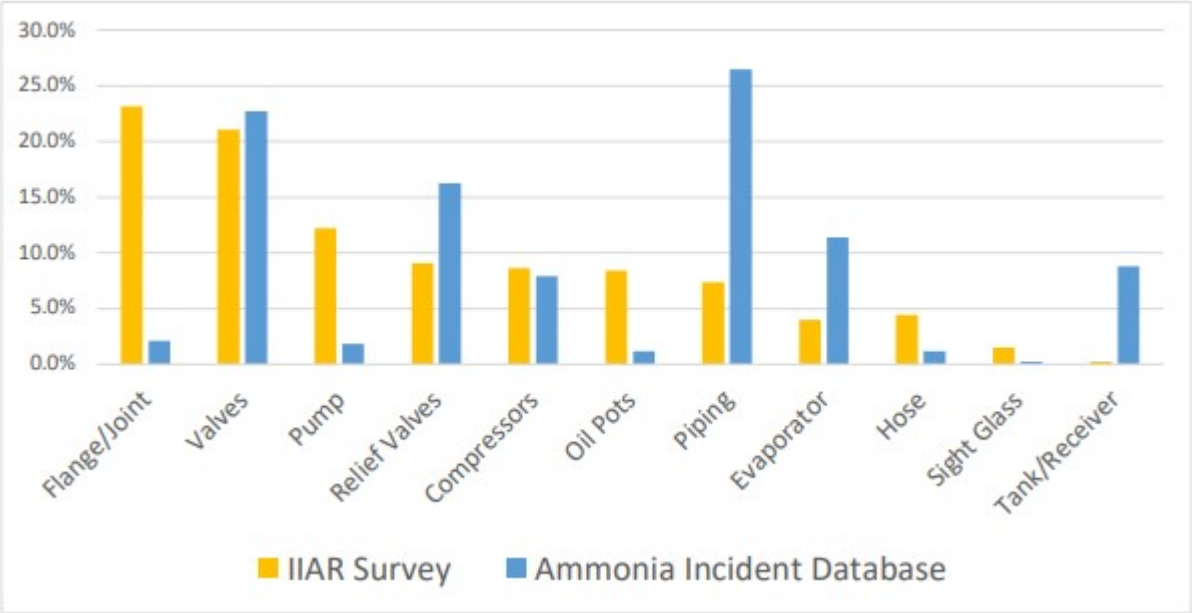
Event Description	Event Date	Items Discussed
Ammonia System Hydraulic Shock (Theodore, AL)	August 23, 2010	• Implications of a power failure on an ammonia refrigeration system • Need to train operators in the proper use of the process controls
Roof Collapse and Evaporator Leak (Sanger, CA)	December 15, 2016	• Importance of sound building structure • Importance of mechanical integrity

The International Institute of Ammonia Refrigeration (IIAR) Technical Paper #7, titled *Case History: A Study of Incidents in the Ammonia Refrigeration Industry*, presented at the 2020 IIAR Conference, summarizes industry incident data compiled through a structured release reporting initiative. In 2004, IIAR established the Ammonia Release Task Force to systematically collect and evaluate information related to ammonia releases across the refrigeration industry.

The objective of this effort was to analyze trends, identify common causal factors, and highlight areas requiring increased operational and maintenance focus. The findings were intended to support improved industry practices, enhance prevention strategies, and ultimately reduce the frequency and severity of ammonia releases.

The first section reviewed was Figure 8, on page 28 of the technical paper. The figure (listed below) summarizes the equipment where releases occurred as reported in the IIAR survey and the Ammonia Incident Database, which indicate that 60 to 65% of the releases occurred from flanges, joints, valves, and piping.

This was consistent with EPA's RMP database, which reports that approximately half of the releases originated from valves and piping.



On page 30 of the technical paper, incident causes were summarized from the Ammonia Incident Database. When related causes were combined into one group, the second largest group at 33%, was caused by human errors (line break, transferring liquid, oil drain, improper valve opened).

It is important to note that eleven incidents, nine from the ammonia refrigeration system and two from ammonia storage terminals, from the Ammonia Incident Database resulted in fatalities. One of the main takeaways from the fatalities is that nine of the eleven incidents were related to line opening, liquid transfer, or oil draining. It seems to be that these operations are the most hazardous conducted in the industry.

4.4 Process Modifications

The ammonia refrigeration system was recently installed and commissioned. Since initial startup, no physical, operational, or procedural modifications have been made to the covered process. The system remains in its original as-designed and as-constructed configuration.

As such, there have been no changes requiring evaluation under the facility's Management of Change (MOC) procedures. Any future modifications to

equipment, controls, operating parameters, or procedures will be subject to formal review in accordance with the established change management process to ensure continued compliance with applicable regulatory and recognized engineering standards.

5 What-if Worksheets

For those deviations that were considered by the study team to be credible, the following information was recorded in the study worksheets:

Controls:
E/A Control (IIAR): the team identified existing engineering and administrative controls for the ammonia refrigeration systems. Those engineering / administrative controls were documented in the “Controls” column. Engineering and administrative controls are existing safeguards which can:

1. Prevent a scenario or a hazardous situation from occurring,
2. Provide an alarm when a hazardous situation is occurring, or
3. Mitigate the consequences of a hazardous situation.

Preventative safeguard (CCPS): intervenes after an initiating cause occurs and prevents the loss event from ensuing, i.e., affects the likelihood of occurrence of the loss event

Mitigative safeguard (CCPS): acts after the loss event(s) have occurred and reduce the loss event impact, i.e., lessen the severity of consequence of the loss event

Severity: a semi-quantitative ranking of the worst consequences associated with each credible scenario. Definitions are shown in Figure 2.

Likelihood: a semi-quantitative ranking of the probability of a cause occurring, which leads to a consequence of concern, given the stated level of safeguards. Definitions are shown in Figure 2.

Risk Ranking: a ranking of the “risk,” considering both the Criticality and Frequency of an occurrence (see Figure 3).

Comments: supplemental relevant information that is provided to document team discussion related to a specific what-if scenario.

Recommendations: recommendations include design, operating, or maintenance changes that reduce or eliminate deviations, causes and/or consequences. If additional information was required, these requests were also formulated as What-if Actions.

5.1 Risk Ranking

To address the requirement for a qualitative evaluation of the range of possible consequences, a risk matrix was used. The risk matrix approach was implemented item-by-item, as the study progressed. After documenting the question, scenario, possible consequences / hazards, and controls for a specific item, the team would rank the risk. The process being studied is partitioned into sections to make the study more manageable and focus on the study team.

A risk-ranking scheme was used for three reasons:

- To evaluate the risk of each hypothesized scenario
- To assess whether additional safeguards are required for scenarios with unacceptable levels of risk
- To allow a means to prioritize recommended actions

Ranking the risk was a simple process:

1. Compare the scenario, consequences, and hazards for an item against the qualitative severity range provided with the matrix that matches most closely for that scenario. Note that safeguards were not considered when assigning a value, i.e., the value was selected under the assumption that safeguards fail.

2. Compare the scenario, the consequences, hazards, and the safeguards against the qualitative likelihood range provided with the matrix and select a frequency that matches most closely for the likelihood for that scenario.

3. Use the severity value and the likelihood value to document the risk ranking, using the matrix.

The purposes of the recommendations are:

- To reduce the probability of occurrence of an incident
- To reduce the severity of the consequences, in the event the incident were to occur;
- Request an update or addition of a document; or
- To request further information, when the scenario could not be fully described owing to a lack of data.

Figure 1 – What-if Risk Ranking Matrix

RISK RANK MATRIX					
	SEVERITY				
LIKELIHOOD	Catastrophic (5)	Severe (4)	Moderate (3)	Minor (2)	Negligible (1)
Highly Likely (4)	A	A	B	B	C
Likely (3)	A	B	B	C	D
Unlikely (2)	B	B	C	C	D
Extremely Unlikely (1)	C	C	D	D	D

Figure 2 – Severity and Likelihood Classifications

QUALITATIVE SEVERITY CRITERIA					
HAZARD	CATASTROPHIC (5)	SEVERE (4)	MODERATE (3)	MINOR (2)	NEGLIGIBLE OR OPERATIONAL (1)
PUBLIC	Multiple Exposure With Irreversible Injuries may include Fatality	Multiple Exposure With Irreversible Injuries (No Fatalities)	Multiple Exposure With Reversible Injuries	Nuisance Smell of Ammonia	Release does not Reach Offsite
OPERATORS and FACILITY PERSONNEL (Per IIAR PSM Guide)	*OR* Potential for multiple life-threatening injuries or fatalities	*OR* Potential for single life- threatening injury or fatality	*OR* Potential for injury requiring a physician's care	*OR* Release restricted to local vicinity with potential injuries requiring no more than first aid	*NA*
ENVIRONMENT	*OR* Extensive Spill of Chemical into Surface Water or Contaminating Ground Water or Killing vegetation	*OR* Large Spill of Chemical into Surface Water or Contaminating Ground Water or Killing vegetation	*OR* Spill of Chemical into Containment Area	None Remains on site	NA
Monetary *(Damage, product loss, injury costs)*	> $1M	$100K to $1M	$10K to $100K	< $10K	N/A

NOTE: *FOR SEVERITY LEVEL RANKING, DONOTCONSIDER SAFEGUARDS AND PROTECTIONS*
NOTE: *MONETARY FACTORS MAY NOT BE INCLUDED IN EACH SCENARIO; IF CONSIDERED, INCLUDE EVALUATION IN "NOTES"*

QUALITATIVE RISK LIKELIHOOD CLASSIFICATION			
HIGHLY LIKELY (4)	LIKELY (3)	UNLIKELY (2)	EXTREMELY UNLIKELY (1)
OSHA Expected to occur yearly in the refrigeration system. Examples: Single instrument failure; valve failure; hose leak; human error	OSHA Expected to occur several times in the lifetime of the refrigeration system. Examples: Dual instrument or valve failures; hose ruptures or piping leaks, trained operators w/procedures injured during LOTO operation	OSHA Expect to occur more than a few times during the lifetime of the refrigeration system. Examples: Combination of instrument failures and human errors; full- bore failures of small process lines or fittings	OSHA Events not expected to occur during the lifetime of the refrigeration system. Examples: Multiple instrument failures or valve failures or human errors; spontaneous failures of tanks or process vessels

NOTE: *FOR LIKELIHOOD LEVEL RANKING, CONSIDER SAFEGUARDS AND PROTECTIONS, WHICH ARE IN PLACE*

Figure 3 – Recommendation Risk Ranking Matrix

The following table indicates the recommendation criterion based on the criticality and frequency ratings listed above.

Risk Rank	Action
A	Unacceptable – should be mitigated with controls to a risk level of B or lower as soon as possible
B	Undesirable – should be mitigated with controls to a risk level of C or lower within a reasonable timeframe
C	Acceptable with controls – should be verified that the cited controls are in place
D	Acceptable – No mitigation action required

5.2 Assumptions

The following list identifies both general and specific assumptions that were made before and during the hazard review.

- Certain recommendations identified during this hazard review are documented within the facility's ANSI/IIAR 9 Mechanical Systems Safety Evaluation (MSSE). To avoid duplication and streamline tracking, recommendations are recorded in a single governing document and cross-referenced as applicable.
- In general, the hazard review evaluated all equipment to the operating limits.
- General maintenance (manufacturer, facility, general industry practice, etc.) and inspection programs were discussed.

- The team considered the appropriate design and methods of operation for the ammonia refrigeration system.
- Alarm and testing programs were discussed.
- External heat sources were assumed to be a fire in / around the system.
- Unless otherwise specified, it was assumed that all process vessels are constructed to ASME code requirements.
- Chemical detection / monitoring and personnel protection issues were discussed.
- It was assumed that vehicle access into the process area is controlled, limited to necessary activities, and that piping is routed, and equipment located such that the potential for vehicle impact to piping and equipment is minimized.
- PRV piping specification issues were explicitly considered during the hazard review.
- The "RECOMMENDATIONS" column was left blank unless the team proposed a recommendation.
- Independent double failures were not considered when assigning a consequence since independent double failures are improbable.
- Safeguards are, in general, used to mitigate the likelihood of a scenario running to its completion. In some cases, however, a safeguard may reduce the severity of a scenario.
- Likewise, recommendations are, in general, developed to mitigate the likelihood of a scenario running to its completion. In some cases, however, a recommendation may reduce the severity of a scenario.
- Similar recommendations may have been applicable for different scenarios but were only listed once (“Duplicate recommendation” may be noted). The one listed recommendation was written to capture and address the nuances of each applicable scenario. This was done to make documentation for the facility streamlined.
- Some recommendations noted for the system were universal and carried over / affected the entire facility and were only listed once.
- If the Team determined that a scenario was an “operational issue only,” had “no significant impact,” or “minor environmental/financial impact,” then the team would state so and not spend time ranking the scenario. Due to either a very low severity or a very low likelihood, the risk is assumed to be minimal from these scenarios.

6 Study Results and Recommended Actions

The study resulted in thorough documentation of credible hazard scenarios and operational concerns for the two ammonia refrigeration processes.

Each recommendation was carefully reviewed to ensure that it is based on an accurate assessment of the design and operation of the process. However, an additional safety review will be necessary to ensure that the implementation does not introduce another hazard. The disposition of each recommended action should be noted and retained to provide a permanent record for auditing and resolution tracking purposes.

A risk ranking system was used by the team to rank each recommendation based on the team's estimate of severity and likelihood of the event. This system was based on a prioritized risk ranking assignment.

TABLE C – NUMBER OF RECOMMENDATIONS

	Risk Ranking	Count
A	Unacceptable / High Risk – Extremely critical, requires immediate mandatory mitigation	0
B	Undesirable / Medium Risk – Critical, requires mitigation within six (6) months	5
C	Acceptable w/ controls / Low Risk – Mitigation is required within one (1) year	19
D	Acceptable / Negligible Risk – Acceptable with / without controls; verify need for safeguards	7
Total Recommendations		**31**

These recommendations are listed in Appendix C.

The recommendations identified in this study will be evaluated and addressed within 2.5 years of the hazard review completion date (no later than August 5, 2028), unless an alternate implementation schedule is formally established in coordination with the CUPA. A careful review of each recommendation may reveal additional ideas or other recommendations that can be substituted for these ideas. Management can justifiably decline to adopt a recommendation when any of the following can be documented:

- Information which was not known by team members becomes available at a later date and eliminates the need for the recommendation;
- The recommendation is not necessary to protect the health of employees, contractors or the environment;
- An alternative measure would provide a sufficient level of protection; or
- The recommendation is not feasible.

Rejection of recommendations must be communicated to the team and subsequent recommendations must also be resolved. The ultimate resolution and the rationale for any rejections must be documented.

What-if Worksheets

What-if/Checklist Logsheet: High Pressure Receiver (HPR)

PHA Date:	2/4/2026	**Process:**	Ammonia Refrigeration - Ice Maker
Team Leader:	Michelle Schlefstein	**Reference P&ID:**	
Team Members:	See sign-in sheet for team members		

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
1.1.1 What if the equipment experiences external corrosion?	The equipment experiences external corrosion. The corroded equipment weakens and a pinhole leak develops.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	This is a new vessel that is installed under roof (in a C-train), Annual ANSI/IIAR 6 looks for corrosion, Ammonia detection (horn / strobe)	Unlikely (2) : *Minor (1)* **C**		
1.1.2 What if the glass on the bulls-eye breaks?	The glass on the bulls-eye breaks during maintenance.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Look for rust around bulls-eye at least annually, (non-documented) inspection during daily rounds, Isolation valves top / bottom, 600 psi MAWP (safe working pressure) of column	Unlikely (2) : *Minor (1)* **C**	Develop and implement a standardized Daily Rounds Inspection Form for the refrigeration system. The form should include documentation of equipment operating condition, oil levels, receiver and vessel levels (e.g., ammonia levels where applicable), system pressures and temperatures (as appropriate), unusual noises or vibration, visible leaks, abnormal odors, and general housekeeping conditions. Completed forms should be retained in accordance with the facility's recordkeeping requirements.	
1.1.3 What if inlet / outlet stop valves are closed with vessel nearly full of ammonia?	Inlet / outlet stop valves are closed, with ammonia in the vessel. A temperature increase causes liquid thermal expansion and hydraulic pressure.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential for thermal and/or hydraulic shock which could lead to equipment damage	Contractor for major maintenance - Maintenance activity would be only reason for valve closures - Equipment would be pumped out, Contractor would utilize LOTO with tag and line break, PRV would lift at set pressure	Unlikely (2) : *Negligible (1)* **D**		
1.1.4 What if there is excessive heat applied onto or into the vessel?	There is a source of excessive heat applied onto or into the vessel most likely from a fire causing an over pressure.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	PRV would lift at set pressure (MAWP = 250 psig & PRV = 250 psig), High discharge cut-out, Vessel is located outside	Unlikely (2) : *Moderate (2)* **C**		
1.1.5 What if the vessel and/or level gauges are not protected from impact?	An object or a vehicle impacts the vessel and/or the level gauge causing damage.	Potential release of ammonia liquid or vapor into an enclosed area and/or atmosphere which could pose a hazard to personnel	Protected by location - engine room is on the third story	Unlikely (2) : *Moderate (2)* **C**		
Charging						
1.2.1 What if a cylinder is dropped during unloading or staging?	A cylinder is mishandled and dropped during the staging or unloading process.	Valve damage with potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Trained personnel; Use of proper cylinder cart or lifting equipment; Valve protection cap during handling	Extremely Unlikely (1) : *Minor (1)* **D**	In the offloading SOP, ensure to include the proper cylinder handling procedures and required PPE.	
1.2.2 What if the cylinder, the unloading hose, and the unloading line are exposed to hazards from moving traffic?	The offloading operation is not properly protected from moving traffic which increases chances of contact.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel		Unlikely (2) : *Moderate (2)* **C**	Include in the offloading procedure measures to control vehicle and pedestrian traffic during cylinder transfer activities, such as the use of cones, caution tape, or temporary barriers to prevent interference with the operation.	

1.2.3 What if a cylinder empties and air is introduced into the system?	The ammonia cylinder weight is not monitored, and the cylinder is not changed out and air is introduced into the system.	Reduced system efficiency with an increase in head pressure.	High discharge safety, Annual check for non-condensibles	Unlikely (2) : *Negligible (1)* **D**		
1.2.4 What if the ammonia has low purity?	The ammonia has low purity and the contaminants could affect the efficiency and the operation of the refrigeration system or result in equipment damage.	Low purity can cause operational issues, ineffective cooling, potentially cause equipment damage, water contamination may lead to corrosion inside the equipment.	Reputable supplier chosen by facility (Airgas)	Extremely Unlikely (1) : *Negligible (1)* **D**	Create an offloading procedure that includes the requirement to request the certificate of conformity to ensure that the ammonia meets the IIAR purity standards.	
1.2.5 What if the charging operation is left unattended?	The charging operation is left unattended. An upset occurs that goes undetected.	The driver may off load more ammonia than ordered, an incident happens and facility personnel are unaware of the operation and not able to take appropriate actions during an ammonia leak.	Refrigeration contractor is the only one that handled the offloading	Extremely Unlikely (1) : *Moderate (2)* **D**	Develop an offloading procedure requiring that cylinder transfer activities be continuously attended by both the contractor and facility personnel until the task is complete.	
1.2.6 What if the driver unloads the cylinder without notifying the facility?	The driver connects and unloads ammonia without contacting facility personnel.	The driver may connect to the wrong location, off load more ammonia than ordered, an incident happens and facility personnel are unaware of the operation and not able to take appropriate actions during an ammonia leak.	Refrigeration contractor schedules delivery day - driver will not be on-site unexpectedly, Delivery driver company policy to notify facility upon arrival	Extremely Unlikely (1) : *Negligible (1)* **D**		
1.2.7 What if there is a leak in the unloading line during charging operations?	An unloading line is used to connect the cylinder to the charging location and the line experiences a leak / rupture.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Ammonia rated hoses are used for the operation	Unlikely (2) : *Moderate (2)* **C**	Include a step in the procedure to verify the manufacture or change-out date of the ammonia-rated hose and confirm it remains within the allowable service life (replacement required every five years).	

Pressure Vessel: PRV

1.3.1 What if the set pressure of the equipment PRV is more than the design pressure of the equipment?	Pressure rises above equipment design. The PRV does not lift because the set pressure is too high and will cause a leak at the weakest point which is most likely on piping and/or appurtenances.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment causing equipment damage and potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV = 250 psi, Vessel MAWP = 250 psi, High pressure cut-out, Hard set compressor safeties that cannot be exceeded, PLC	Unlikely (2) : *Moderate (2)* **C**	Create a master PRV list is created to meet ANSI/IIAR 6-2019, Section 5.3.3: PRV manufacturer, PRV model number and set pressure, and where applicable, model number and installation / replacement date.	
1.3.2 What if the PRV capacity is too low?	An overpressure condition exists. The PRV lifts but can not meet relief capacity demand.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Equipment damage; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	System was designed by a refrigeration contractor who determined the specifications of the PRV SCFM and associated PRV lines and header	Unlikely (2) : *Minor (1)* **C**	Request documentation on the PRV design and design calculations to ensure they meet the requirements of ANSI/IIAR 2-2021.	
1.3.3 What if there is a closed stop valve before/after an PRV?	A stop valve before/after a PRV is not secured open, and the valve is left shut after maintenance or inadvertently closed.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	No valves before / after the PRV	Extremely Unlikely (1) : *Moderate (2)* **D**		
1.3.4 What if a PRV is installed to discharge into the piping / system or a piece of equipment?	A PRV discharges into piping/system that is not vented to atmosphere. There is a rise in pressure downstream of the PRV. This causes a rise in the set point of the PRV.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV ties into main header	Unlikely (2) : *Minor (1)* **C**		

1.3.5 What if the PRV intended for vapor service is not connected above the highest anticipated liquid ammonia level (i.e. oil cooler)? Exception: Oil pot and similar applications shall be located at the highest point on the vessel	The PRV is not installed above the highest anticipated liquid level and liquid ammonia is sent to the PRV header potentially effecting the connecting PRVs.	Potential increases in pressure down stream which could result in pressures above the maximum allowable pressure rating of the equipment; Potential equipment damage which potential may lead to a release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV is located at top of vessel (above highest anticipated liquid ammonia level) and is rated for vapor	Unlikely (2) : *Minor (1)* **C**		
1.3.6 What if PRVs are not installed with a three-way shut off valve?	A single pressure relief device is installed but the following is not provided: a. Vessel can be isolated; b. Relief device is on the low side; and c. Other vessels are separately protected	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Dual PRV on a 3-way	Extremely Unlikely (1) : *Negligible (1)* **D**		

What-if/Checklist Logsheet: Ice Machine, Surge Drum, OP

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
2.1.1 What if an isolated evaporator containing ammonia experiences a temperature rise from ambient or applied heat from the continued circulation of air?	An isolated evaporator containing liquid experiences a temperature rise and generates hydrostatic pressure.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential for thermal and/or hydraulic shock which could lead to equipment damage	If equipment is isolated, it would be part of a maintenance activity - it would be pumped out per procedure and valved out	Unlikely (2) : *Minor (1)* **C**		
2.1.2 What if the equipment experiences external corrosion?	The equipment experiences external corrosion. The corroded equipment weakens and creates a pinhole leak.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Stainless steel drum limits corrosion	Unlikely (2) : *Minor (1)* **C**		
2.1.3 What if there is loss or reduction of ammonia to the evaporator?	Loss or reduction of flow to the evaporator would lead to loss of cooling resulting primarily in operability issues	No hazardous consequences identified for this scenario - operational issues - insufficient heat exchange / cooling	Flooded evaporator coil (surge drum) helps reduce chance of loss or reduction of liquid, Ice manufacturing would suffer - no anticipated safety issues	Likely (3) : *Negligible (1)* **D**		
2.1.4 What if there is an increase of ammonia to the evaporator, for example due to the failure of a valve in the liquid feed line?	An increase of ammonia to the evaporator could lead to flooding inside the evaporator. Ammonia liquid could be carried-over to compressor (slugging) and damages the compressor casing or sealing components.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Hand expansion valves - Individual would have to manually close / open valve, No employees authorized to turn valves - contractor would set the valve position	Unlikely (2) : *Moderate (2)* **C**		
2.1.5 What if there is a change in loading on the evaporator, for example due to the start-up or shutdown of production equipment?	A change in loading on the evaporator would primarily result in operability issues.	No hazardous consequences identified for this scenario - operational issues - insufficient heat exchange / cooling	N/A - No production			
Air Unit Cooler or Freezer						
2.2.1 What if too many units are defrosted simultaneously?	If too many units are defrosted at the same time, a larger amount of liquid ammonia than engineered returns to the supply vessel, raising the vessel level above operating level.	This may cause an increase in liquid returning to an accumulator; Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment	Units are defrosted as needed (when the scraper is stuck to the drum)	Unlikely (2) : *Moderate (2)* **C**	Evaluate operational conditions and establish a defined defrost schedule for the ice maker to support efficient operation and prevent excessive ice buildup.	
Generic Evaporator: Facility Sitting						
2.3.1 What if an evaporator is impacted by moving equipment?	Evaporator is impacted by moving equipment and causes damage to equipment and piping.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Protected by location - Equipment is on the third story	Unlikely (2) : *Moderate (2)* **C**		
Oil Pot						
2.4.1 What if oil is not completely removed from the system, for example because the oil doesn't drain properly from the vessel to the oil pot?	If oil is not completely removed from the system the residual oil could lead to inefficient cooling and the failure of instruments / control systems and ammonia pumps	No hazardous consequences identified for this scenario - inefficient heat exchange / cooling	Individual can see the frost / ice line on the oil pot and schedule oil draining activities or determine if it was efficient or not	Unlikely (2) : *Negligible (1)* **D**		

2.4.2 What if proper procedures are not followed during removal of oil from the oil pot?	If proper procedures are not followed during oil removal a release may result or injury to technician.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel.	Contractor will drain oil	Unlikely (2) : *Severe (3)* **B**	Develop a written oil draining procedure consistent with ANSI/IIAR 7 requirements. The procedure should address isolation steps, the duration required to allow residual ammonia to boil off prior to draining, coordination with the contractor's limited on-site duration, and whether water-assisted methods will be utilized.	
2.4.3 What if the oil pot is liquid filled and then isolated by closing manual valves to/from the oil pot?	An isolated oil pot containing liquid experiences a temperature rise and generates hydrostatic pressure increase.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Valve closure is part of the oil draining procedure	Highly Likely (4) : *Minor (1)* **B**	See 2.4.2 recommendation	

Pressure Relief Valves

2.5.1 What if the PRV intended for vapor service is not connected above the highest anticipated liquid ammonia level (i.e. oil cooler)? Exception: Oil pot and similar applications shall be located at the highest point on the vessel	The PRV is not installed above the highest anticipated liquid level and liquid ammonia is sent to the PRV header potentially effecting the connecting PRVs.	Potential increases in pressure down stream which could result in pressures above the maximum allowable pressure rating of the equipment; Potential equipment damage which potential may lead to a release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV is located at top of vessel (above highest anticipated liquid ammonia level) and is rated for vapor, Oil pot is at highest point on vessel - oil pot has small (air) space at top of vessel	Unlikely (2) : *Minor (1)* **C**		
2.5.2 What if the set pressure of the equipment PRV is more than the design pressure of the equipment?	Pressure rises above equipment design. The PRV does not lift because the set pressure is too high and will cause a leak at the weakest point which is most likely on piping and/or appurtenances.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment causing equipment damage and potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV is not more than MAWP (250), Confirmed at time of installation / change-out	Unlikely (2) : *Moderate (2)* **C**		
2.5.3 What if there is a closed stop valve before/after an PRV?	A stop valve before/after a PRV is not secured open, and the valve is left shut after maintenance or inadvertently closed.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	No stop valves before / after the PRV	Extremely Unlikely (1) : *Moderate (2)* **D**		
2.5.4 What if a PRV is installed to discharge into the piping / system or a piece of equipment?	A PRV discharges into piping/system that is not vented to atmosphere. There is a rise in pressure downstream of the PRV. This causes a rise in the set point of the PRV.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRVs discharge into header	Unlikely (2) : *Minor (1)* **C**		
2.5.5 What if the PRV capacity is too low?	An overpressure condition exists. The PRV lifts but can not meet relief capacity demand.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Equipment damage; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	System was designed by a refrigeration contractor who determined the specifications of the PRV SCFM and associated PRV lines and header	Unlikely (2) : *Minor (1)* **C**	See 1.3.1 recommendation	

2.5.6 What if PRVs are not installed with a three-way shut off valve?	A single pressure relief device is installed but the following is not provided: a. Vessel can be isolated; b. Relief device is on the low side; and c. Other vessels are separately protected	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Both vessels have dual PRV on three-way, Single PRV on oil pot	Unlikely (2) : *Negligible (1)* **D**		

What-if/Checklist Logsheet: Suction Accumulator

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
3.1.1 What if the equipment experiences external corrosion?	The equipment experiences external corrosion. The corroded equipment weakens and a pinhole leak develops.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Vessel is insulated, New installation - No vapor barrier failures	Unlikely (2) : *Minor (1)* **C**		
3.1.2 What if the glass on the bulls-eye breaks?	The glass on the bulls-eye breaks during maintenance.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Vessel bulls-eye have a MAWP of 600-650 psig which is much higher than vessel it's installed on, Isolation valves on column	Unlikely (2) : *Minor (1)* **C**		
3.1.3 What if there are high pressures / temperatures in the vessel?	Higher pressures/temperatures in the vessel could lift PRVs and/or causes a leak at the weakest point.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	MAWP = 250 (115F) - would see high pressure may be seen if vessel is isolated (if isolated, the vessel would be pumped out). PRV would activate to relieve pressure	Unlikely (2) : *Minor (1)* **C**		
3.1.4 What if there are lower pressures/temperatures in the vessel?	Low pressures/temperatures in the vessel could mean that the vessel is operated below its minimum design temperature.	Potential decreases in system temperature and pressure which could result in pressures below the minimum allowable temperature of the equipment	Not expected to be lower than (anticipated) house suction of 5 psig (-17F), Vessel's MDMT = -50F - not expected to exceed MDMT	Likely (3) : *Negligible (1)* **D**		
3.1.5 What if inlet / outlet stop valves are closed with vessel nearly full of ammonia?	Inlet / outlet stop valves are closed, with ammonia in vessel. A temperature increase causes liquid thermal expansion and hydraulic pressure.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential for thermal and/or hydraulic shock which could lead to equipment damage	Valve closure would be part of maintenance task (LOTO, SOP) and equipment would be pumped out, SOPs have instructions for pump out / isolation, PRV activation to help lower pressure in vessel	Unlikely (2) : *Moderate (2)* **C**		
3.1.6 What if there is excessive heat applied onto the vessel?	There is a source of excessive heat applied onto or into the vessel most likely from a fire causing an over pressure.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	PRV would lift at set pressure, Fire extinguishers available for use	Unlikely (2) : *Moderate (2)* **C**		
3.1.7 What if the vessel and/or level gauges are not protected from impact?	An object or a vehicle impacts the vessel and/or the level gauge causing damage.	Potential release of ammonia liquid or vapor into an enclosed area and/or atmosphere which could pose a hazard to personnel	Protected by location - Equipment is on the third story	Unlikely (2) : *Moderate (2)* **C**		
3.1.8 What if the vessel accumulates ice?	The vessel slowly builds ice through operation until it is too heavy for the structure and causes damage to the structure and vessel. Vessel corrosion can occur under insulation. Valves cannot be operated when covered in ice.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel; Prolonged ammonia release due to issues with valve access	Vessel is insulated and not suspended from building structure	Likely (3) : *Negligible (1)* **D**		

Pressure Relief Valves

3.2.1 What if the set pressure of the equipment PRV is more than the design pressure of the equipment?	Pressure rises above equipment design. The PRV does not lift because the set pressure is too high and will cause a leak at the weakest point which is most likely on piping and/or appurtenances.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment causing equipment damage and potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV is not more than MAWP (250), Confirmed at time of installation / change-out	Unlikely (2) : *Moderate (2)* **C**		
3.2.2 What if the PRV capacity is too low?	An overpressure condition exists. The PRV lifts but can not meet relief capacity demand.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Equipment damage; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	System was designed by a refrigeration contractor who determined the specifications of the PRV SCFM and associated PRV lines and header	Unlikely (2) : *Minor (1)* **C**	See 1.3.1 recommendation	
3.2.3 What if there is a closed stop valve before/after an PRV?	A stop valve before/after a PRV is not secured open, and the valve is left shut after maintenance or inadvertently closed.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	No stop valves before / after the PRV	Extremely Unlikely (1) : *Moderate (2)* **D**		
3.2.4 What if a PRV is installed to discharge into the piping / system or a piece of equipment?	A PRV discharges into piping/system that is not vented to atmosphere. There is a rise in pressure downstream of the PRV. This causes a rise in the set point of the PRV.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV discharges into header	Unlikely (2) : *Minor (1)* **C**		
3.2.5 What if the PRV intended for vapor service is not connected above the highest anticipated liquid ammonia level (i.e. oil cooler)? Exception: Oil pot and similar applications shall be located at the highest point on the vessel	The PRV is not installed above the highest anticipated liquid level and liquid ammonia is sent to the PRV header potentially effecting the connecting PRVs.	Potential increases in pressure down stream which could result in pressures above the maximum allowable pressure rating of the equipment; Potential equipment damage which potential may lead to a release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	PRV is located at top of vessel (above highest anticipated liquid ammonia level) and is rated for vapor	Unlikely (2) : *Minor (1)* **C**		
3.2.6 What if PRVs are not installed with a three-way shut off valve?	A single pressure relief device is installed but the following is not provided: a. Vessel can be isolated; b. Relief device is on the low side; and c. Other vessels are separately protected	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Vessel has a dual PRV on three-way	Unlikely (2) : *Negligible (1)* **D**		

Vessel Levels

3.3.1 What if there is a high liquid level in the vessel?	High liquid level develops in the vessel which causes liquid ammonia to be carried over to the compressor. Slugging of compressor occurs. This damages the compressor casing or sealing components.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	High level interlock will shut off all compressor connected to the vessel	Likely (3) : *Moderate (2)* **B**	Verify that the high-level float interlock initiates compressor shutdown upon detection of a high liquid level condition.	
3.3.2 What if the high level alarms and/or cutouts associated with the vessel do not function due to improper maintenance?	High level in the vessel may go undetected in the vessel if the low level alarms and/or cutouts do not function which could cause cavitation and damage the pump.	Equipment damage which may lead to a potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Annual high level interlock testing will be carried out	Likely (3) : *Moderate (2)* **B**	See ANSI/IIAR 9 recommendation for the documentation of the high level float testing.	

3.3.3 What if there is not enough liquid to fill the internal coil?	The liquid ammonia level in the high pressure receiver is low and no liquid is being circulated in the internal coil.	A low liquid level in a suction accumulator equipped with an internal heat exchanger coil primarily leads to reduced, ineffective heat transfer, which can increase the risk of liquid refrigerant entering the compressor. The internal coil is designed to use hot liquid line refrigerant to evaporate trapped liquid suction-side refrigerant, so a low liquid level reduces the contact between the liquid and the coil.	Low oil / discharge temperature, Phase separation occurs in the vessel with the suction line at the top to help ensure it is a dry suction return to the compressor	Unlikely (2) : *Moderate (2)* **C**		

What-if/Checklist Logsheet: Compressor, OS

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
4.1.1 What if the compressor coalescer man-way gasket blows out? (Screw compressors only)	The man-way gasket is installed incorrectly or the man-way bolts loosen after maintenance and fails during compressor operation. The gasket fails and causes ammonia / oil release that could lead to a fire.	Potential release of ammonia vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Torque to bolt spec, Change gasket if needed (if gasket is hard or has noticeable damage), May go back to test bolts, Ammonia detection (horn / strobe, HMI notification)	Unlikely (2) : *Moderate (2)* **C**		
4.1.2 What if suction check valve fails open and compressor shuts off?	A compressor unexpectedly shuts down (e.g., loss of electrical power, safety trips, etc.). Oil in separator back flows through the compressor suction. Oil loss causes low oil pressure and compressor fails to start.	Operational issue, no ammonia release expected	Low oil level in sight glass, May be adding oil more frequently	Unlikely (2) : *Negligible (1)* **D**		
4.1.3 What if plugs, caps, or blind flanges are missing on purge or drain valves?	A valve is inadvertently opened or leaks and there is no plug or cap to prevent release.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Employee may pick up ammonia smell on daily rounds, Part of daily (undocumented) rounds to look for missing items, Ammonia detection (horn / strobe, HMI notification)	Likely (3) : *Minor (1)* **C**		
4.1.4 What if compressors do not load up properly?	Compressors do not load up properly. This could raise the suction pressures in the system and potentially overload (and damage) the compressor motors.	Potential equipment damage and increase in compressor pressures	N/A - only one compressor	Unlikely (2) : *Minor (1)* **C**		
4.1.5 What if a slug of liquid is sent to the compressor?	Slug of liquid sent to the compressor could damage the compressor.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Low suction temperature alarm / cut-out, Wet suction return is to suction accumulator where phase separation occurs and high level interlock, Compressor discharge (into oil separator) TD will pick up low discharge temperature and shut off	Unlikely (2) : *Moderate (2)* **C**		
4.1.6 What if there are problems with a compressor motor bearing?	Problems with a compressor motor bearing could lead compressor failure, resulting in a loss of cooling.	Operational issue, no ammonia release expected	Annual vibration analysis will be completed which indicates future bearing failure, Grease bearings quarterly	Likely (3) : *Minor (1)* **C**		
4.1.7 What if compressors load up too quickly?	Compressors do not load up properly. This could raise the suction pressures in the system and potentially overload (and damage) the compressor motors.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	N/A - only one compressor	Unlikely (2) : *Minor (1)* **C**		
4.1.8 What if a sealing component (e.g., mechanical seals, etc.) fails?	A sealing component fails and a leak develops.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Ammonia detection (horn / strobe, HMI notification and call out)	Likely (3) : *Minor (1)* **C**	Perform and document weekly inspection of compressor shaft seal leak rates in accordance with ANSI/IIAR 6, Section 6.1. Documentation may be incorporated into the daily rounds sheet or maintained through other established record keeping methods.	

4.1.9 What if a compressor discharge valve is closed?	A compressor discharge valve is closed. An overpressure condition develops and may lift PRVs.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment	High discharge alarm / cut-out, Valve closure would be part of maintenance task (LOTO, SOP) and the contractor would be the one to isolate the equipment	Likely (3) : *Minor (1)* **C**		
4.1.10 What if a compressor suction valve is closed?	A compressor suction valve is closed. Starved compressor overheats and fails one or more sealing components.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Low suction alarm / cut-out, Valve closure would be part of maintenance task (LOTO, SOP) and the contractor would be the one to isolate the equipment	Likely (3) : *Minor (1)* **C**		
4.1.11 What if a compressor suction strainer plugs?	A compressor suction strainer plugs. Starved compressor overheats and fails one or more sealing components.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Checked during a compressor rebuild and change if needed	Extremely Unlikely (1) : *Minor (1)* **D**		

Compressors: I&C

4.2.1 What if the instrumentation tubing is improperly supported and/or protected?	There is inadequate support which can result in chafing. The tubing is not protected from impact and is struck by moving equipment.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Supported per manufacturer package installation, Ammonia detection (horn / strobe, HMI notification)	Unlikely (2) : *Minor (1)* **C**		
4.2.2 What if the computer control system or other control system fails?	A computer control system fails or control of the system is lost. The operator cannot see the current compressor operating pressures.	Potential incorrect operating decisions are made; Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment causing an ammonia leak with hazards to personnel	System will not be affected if control system is lost (not fully controlled by computer system)	Unlikely (2) : *Minor (1)* **C**		
4.2.3 What if there is inadequate PM on instrumentation / controls?	There is inadequate PM on instrumentation/controls (e.g., temperature sensors, pressure sensors, level sensors, gauges, floats, thermometers, etc.), causing false readings and resulting in an incorrect decision.	Potential for equipment damage due to mis-operation of the equipment; Potential increases in system temperature and pressure; Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	The PT / TT on compressor is calibrated on annual basis	Unlikely (2) : *Moderate (2)* **C**		

Compressors: Oil & Cooling Systems

4.3.1 What if a lubrication oil piping fails?	A lubrication oil piping or equipment component fails and a leak develops.	Potential for fire hazard; Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Compressor safeties would shut down equipment to prevent damage	Unlikely (2) : *Minor (1)* **C**		
4.3.2 What if the compressor is inadequately lubricated?	The compressor is running. The lubrication system fails, such as a plugged filter, a stopped oil pump, or an oil loss. Compressor experiences accelerated mechanical wear. The sealing component fails.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Replace oil pump filters when >15 psig differential is recognized, Low oil filter pressure, Low oil temperature alarm / cut-out	Unlikely (2) : *Moderate (2)* **C**		
4.3.3 What if the oil separator (coalescer) inside the compressor fails?	Oil separator fails, potentially resulting in carry-over of lubrication oil into the system which could reduce the system efficiency and potentially caused accelerated mechanical wear on the compressor. The sealing component on the compressor fail.	Reduce system efficiency and loss of cooling; Potential equipment damage	See oil on dry side of compressor, Daily (visual) rounds for oil check on dry side	Unlikely (2) : *Minor (1)* **C**		
4.3.4 What if there is insufficient flow of the cooling medium to the compressor?	Insufficient flow of cooling medium overheats compressor oil, mechanical seals, etc. The excessive heat fails one or more sealing components.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Compressors have LIC directly from HPR, High oil temperature alarm / cut-out	Unlikely (2) : *Minor (1)* **C**		

4.3.5 What if ammonia and/or oil were being lost or accumulated and records were not maintained to record the amounts?	Ammonia escaping undetected into the atmosphere could potentially impact an employee or neighbor. Oil accumulating in the system would likely have an impact of only operational consequence.	Oil - No hazardous consequences identified for this scenario, operational consequence; Ammonia - Potential release of ammonia liquid or vapor into the atmosphere with environmental and/or personnel consequences		Unlikely (2) : *Negligible (1)* **D**	Create an oil drain log which will list the amount of oil in and amount of oil drained.	
4.3.6 What if the compressor oil levels are inadequate, incompatible, or contaminated?	Lube oil levels are inadequate. Compressor experiences accelerated mechanical wear, failing sealing components and resulting in an ammonia release.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Compressor manufacturer added oil prior to start-up, Facility does not reuse oil	Unlikely (2) : *Moderate (2)* **C**		
4.3.7 What if the compressor oil heater is not energized with the compressor off?	Ammonia condenses / accumulates in the oil sump. The compressor starts and a mechanical failure or seal rupture condition exists, resulting in an ammonia release.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Compressor will not start due to low oil temperature	Unlikely (2) : *Minor (1)* **C**		
4.3.8 What if there is a closed stop valve before/after an PRV?	A stop valve before/after a PRV is not secured open, and the valve is left shut after maintenance or inadvertently closed.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	N/A - LIC is used (PRV common for thermosyphon oil cooling)	Highly Likely (4) : *Moderate (2)* **B**		

Compressors: Safety Systems

4.4.1 What if there are missing or insufficient compressor cut-outs / safeties / interlocks?	There are missing or insufficient safeties and the compressor fails to shutdown during emergency.	Exceed safe operating parameters, Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Compressors come from the factory with safeties that can be set by the facility, Hard set compressor safeties (operating parameters) that cannot be changed	Extremely Unlikely (1) : *Severe (3)* **C**		
4.4.2 What if the compressor cut-outs/safeties/interlocks are not periodically tested or inspected?	The safeties ITM schedule is not followed which may not catch failure. The compressor does not shut down when an unsafe condition arises.	Exceed safe operating parameters, Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Compressor safeties will be tested annually	Unlikely (2) : *Moderate (2)* **C**		

What-if/Checklist Logsheet: Condenser

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
5.1.1 What if a stop valve is closed on the condenser inlet and/or outlet?	A stop valve is closed on the condenser inlet and/or outlet. An over pressure condition develops at the compressor discharge. The over pressure lifts PRVs.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	Valve closure would be part of maintenance task (LOTO, SOP) and equipment would be pumped out, SOPs will have instructions for pump out / isolation, High discharge alarm / cut-out	Unlikely (2) : *Minor (1)* **C**		
5.1.2 What if condenser water freezes on condenser structure?	Water freezes on condenser structure and the ice build-up causes the structure to expand at the joints. This eventually weakens the structure.	Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	N/A - Condenser is located in the C-train			
5.1.3 What if there is insufficient cooling to the condenser, or example due to a loss of cooling water flow?	Insufficient cooling decreases amount of ammonia condensed. Overpressure develops between compressor discharge and receiver.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	High discharge alarm / cut-out, Water sump float helps to maintain proper water level	Unlikely (2) : *Moderate (2)* **C**		
5.1.4 What if the condenser structural supports and enclosure are weakened?	Corrosion / vibration weakens a structural component. The equipment support fails and damages the equipment and piping.	Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	Condenser is not on supports, it sits at ground leve	Extremely Unlikely (1) : *Moderate (2)* **D**		
5.1.5 What if non-condensables accumulate in the condenser?	Non-condensables could lead to a rise in system head pressure, which could result in higher than normal discharge pressure.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment	Not expected in system since it does not run in a vacuum, High discharge alarm / cut-out	Unlikely (2) : *Negligible (1)* **D**		
5.1.6 What if cooling water splashes out of the water basin?	Cooling water splashing out of the water box contacts the equipment causing corrosion. The corroded equipment weakens and a pinhole leak develops.	Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	Float in condenser sump helps maintain water level (which helps limit splashes), Mist eliminators	Likely (3) : *Negligible (1)* **D**		
5.1.7 What if there loss of heat rejection surface due to no chemical treatment system or dirty media?	If the condenser cooling water is not properly treated there could be increased fouling and less efficient operation due to scale build-up. Could cause high head pressures.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel		Unlikely (2) : *Negligible (1)* **D**	Assess water quality to determine the appropriate condenser water treatment chemicals and dosing program necessary to minimize scale buildup and support efficient condenser operation.	

Condenser

5.2.1 What if a fan blade breaks?	A broken fan blade could lead to equipment damage.	Potential equipment damage which may lead to a potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	Control system monitors fan on / off, Fan shroud helps limit throw if blade breaks, Annual ANSI/IIAR 6 inspection looks at cracks on blade	Unlikely (2) : *Minor (1)* **C**		

5.2.2 What if there is a tube leak/rupture?	A tube leaks/ruptures due to high gas pressure, hydraulic pressure, corrosion, or erosion (e.g., liquid impinging on tube wall).	Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences	Individual may notice a smell when equipment is shut down	Unlikely (2) : *Minor (1)* **C**		

Generic Condenser: Facility Siting

5.3.1 What if a condenser is impacted by a vehicle?	A condenser is impacted by a moving vehicle cause damage to equipment and/or piping.	Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences and potential personnel exposure	Equipment is located on the third story	Extremely Unlikely (1) : *Moderate (2)* **D**		
5.3.2 What if valves are not accessible?	A valve is not accessed quick enough in an emergency situation, resulting in a prolonged release.	Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences and potential personnel exposure	Condenser valves are all located within the C-train	Likely (3) : *Minor (1)* **C**		

What-if/Checklist Logsheet: Piping, Valves, & PRV (General)

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
6.1.1 What if a valve sealing component leaks?	A valve sealing component (e.g., stem packing, gasket, etc.) leaks.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Ammonia detection in engine room, Employee may notice an ammonia smell during daily rounds or walk through	Likely (3) : *Negligible (1)* **D**		
6.1.2 What if piping experiences external corrosion?	Piping experiences external corrosion (e.g., from condensation, from splashing/dripping of water, from exposure to corrosive chemicals, etc.). The corrosion causes a pinhole leak to develop.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Piping is brand new and no corrosion is expected for sometime	Likely (3) : *Minor (1)* **C**		
6.1.3 What if there is inadequate piping support?	Piping supports/saddles are inadequate or improperly adjusted (e.g., to accommodate thermal expansion and contraction). Overstressing of piping system occurs and pipes/flanges/connections fail.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Seismic assessment was a part of the city approval process, Piping supports are present	Unlikely (2) : *Moderate (2)* **C**		
6.1.4 What if ice builds up on piping?	Ice build upon piping exceeds pipe supports.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Piping is insulated where ice may be expected	Likely (3) : *Minor (1)* **C**		
6.1.5 What if liquid ammonia accumulates in return line, for example because the line is not properly sloped?	Liquid accumulates in return line and there is an unexpected pressure surge and slugging occurs. The slugging ruptures the pipe, valve, or endcap.	Ammonia accumulates and may potentially send liquid to compressors if on a suction line / header; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	The system was designed and installed by a qualified refrigeration contractor to address this condition, Performance will be confirmed during system operation.	Unlikely (2) : *Moderate (2)* **C**		
6.1.6 What if hot gas condenses in a hot gas supply header?	Hot gas condenses in a hot gas supply header which can cause slugging / hammering of the liquid condensate.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	N/A - no hot gas used in this system			
6.1.7 What if a valve that requires a special manufacturer tools is not given to facility personnel?	A valve requires a manufacturer tool to operate. The operation of the valve is required for maintenance and/or during an emergency and the facility personnel does not have to tool or is unaware of the situation.	Extended ammonia release, Over pressure condition	Danfoss requires a magnet - contractor keeps this tool on their truck	Likely (3) : *Minor (1)* **C**		
Piping & Valves: Facility Siting						
6.2.1 What if piping is impacted by a vehicle?	Piping is impacted by a vehicle or moving object causing damage.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	All piping is contained in the C-train on the third story	Unlikely (2) : *Moderate (2)* **C**		
Piping & Valves: Human Factors						
6.3.1 What if piping is mislabeled?	Piping is mislabeled and consequently, an employee uses the pipe incorrectly.	Potential for equipment damage due to mis-operation of the equipment which potentially may lead to a release of ammonia with potential hazard to personnel	Equipment and pipe labels are present	Unlikely (2) : *Minor (1)* **C**		
Piping & Valves: Insulation & Material						
6.4.1 What if the wrong material of construction was used for the piping or valves?	The wrong material of construction could lead to premature failure of the piping or valves.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	U-1As are on file, Use contractor for construction jobs - internal QA process	Unlikely (2) : *Minor (1)* **C**		

6.4.2 What if undetected corrosion thinned ammonia piping beneath the insulation (CUI)?	Corroded ammonia piping could weaken and release ammonia to the atmosphere through small pinhole pipe failures.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	CUI is not expected for some time since this is a new installation (will be covered at the re validation in 5 years), Hot gas is not used which is leading cause of CUI due to change in temperatures	Unlikely (2) : *Minor (1)* **C**		

Pressure Relief Vavle

6.5.1 What if the equipment's PM Program for PRVs is insufficient or non-existent?	A PRV's PM Program is insufficient or non-existent. The PRV fails to perform as designed (e.g., PRV fails to lift at set pressure during an overpressure condition; PRV leaks; or PRV lifts below its set pressure).	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Facility changes PRVs every 5 years or when activated	Unlikely (2) : *Minor (1)* **C**	The pressure relief valve (PRV) punch cards do not reflect the correct installation year (2026) and currently indicate 2025. Request that the contractor replace the punch cards and mark the correct installation month and year.	
6.5.2 What if the PRV opens below its set pressure?	Vibration, incorrect design, weakened PRV spring, failure of valve seat material, etc., causes PRV to lift below its set pressure.	Potential release of ammonia liquid or vapor into the atmosphere with environmental consequences or release to a diffusion tank with no environmental / personnel consequences	PRV would be changed out and system trending would be looked at for system pressures	Unlikely (2) : *Negligible (1)* **D**		
6.5.3 What if liquid accumulates in the PRV discharge piping?	Rain/condensate in piping corrodes PRV, accumulates on PRV, or freezes in piping. Corrosion causes premature lifting; or ice blocks PRV discharge.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment; Release to diffusion tank with no environmental / personnel consequences; Potential release of ammonia vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel		Unlikely (2) : *Negligible (1)* **D**	Ensure a cap is placed on top of PRV termination point to prevent water from entering piping.	
6.5.4 What if multiple PRV discharges occur in piping and header has insufficient capacity?	Multiple PRV discharges create excessive back-pressure on other PRVs because the header has insufficient capacity. Overpressure of relieving vessel occurs.	Potential increases in pressure down stream which could result in pressures above the maximum allowable pressure rating of the equipment; Potential equipment damage which potential may lead to a release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Refrigeration contractor designed the system and took into account the multiple PRVs	Likely (3) : *Minor (1)* **C**	See 1.3.2 recommendation	
6.5.5 What if a PRV develops a small leak and there is no system in place to identify the leak?	A small ammonia leak through a PRV would discharge through the vent to the atmosphere or diffusion tank.	Potential release of ammonia vapor into an enclosed area which could pose a hazard to personnel	Individual would notice ice on PRV discharge piping and notify the service contractor	Unlikely (2) : *Negligible (1)* **D**		
6.5.6 What if the PRV fails to lift at/above its set pressure?	An overpressure condition exists and the PRV fails to lift at its set pressure. The overpressure causes a leak at the weakest part of the system, mostly likely piping.	Potential increases in pressure which could result in pressures above the maximum allowable pressure rating of the equipment causing equipment damage and potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Compressor safeties would activate (if on high side), Ammonia detection (horn / strobe, HMI notification)	Unlikely (2) : *Moderate (2)* **C**		

Valves: Valve Activity

6.6.1 What if valves are left in the closed or open position for a long period of time without cycling?	A valve is left in position for a long time. The valve is needed for venting, draining, equalizing, emergency procedures, etc. When needed, the valve is stuck and will not cycle.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Valve exercise is part of service PM agreement	Unlikely (2) : *Moderate (2)* **C**		

What-if/Checklist Logsheet: Facility Siting

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
7.1.1 What if an ammonia release is drawn back into the facility by HVAC equipment?	An ammonia release is drawn back into the facility by HVAC equipment. This increases the exposure of employees to hazardous consequences.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	None within 20' of ventilation discharge	Unlikely (2) : *Minor (1)* **C**		
7.1.2 What if there is insufficient access or egress (especially elevated locations) for maintenance or emergencies?	There is insufficient access or egress to equipment or areas in the system. This increases the chances of employee injury or may decrease the chances of PM from occurring as frequently as required.	Potential extended release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	One staircase up / down to access areas (3 stories)	Unlikely (2) : *Moderate (2)* **C**		
Facility Siting: Emergency Situation						
7.2.1 What if the emergency plan, the evacuation routes, and assembly point is not sited with consideration of possible incident locations?	If the routes and assembly points are not sufficient personnel may be vulnerable during a release.	Ammonia exposure to facility personnel during an evacuation		Unlikely (2) : *Moderate (2)* **C**	Create an EAP and create an evacuation map for the facility (currently working with law enforcement on this).	
Facility Siting: Secondary Equipment or Process						
7.3.1 Is there potential for an incident with non-refrigeration equipment to affect refrigeration equipment or vice versa?	If one piece of equipment could affect another piece of equipment (domino effect) in an ammonia release.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Main chemical is ammonia - release of ammonia likely not to affect other ammonia system equipment; No other process release on site will affect the ammonia system, Equipment / system interlocks / safeties activate w/o human intervention	Unlikely (2) : *Moderate (2)* **C**		
7.3.2 What if there is a chemical leak from a nearby process or at a nearby facility which affects this system?	If the chemical leak from a nearby process or at a nearby facility could affect the refrigeration system and/or personnel.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	No chemical sites nearby that would effect facility	Extremely Unlikely (1) : *Negligible (1)* **D**		
Facility Siting: Site Setup						
7.4.1 What if the discharge of a PRV is placed in an area where employees can be exposed?	The discharge of an PRV is placed in an area where employees can be exposed (e.g., emergency assembly points). The PRV lifts, resulting in an employee exposure.	Potential release of ammonia vapor into the atmosphere with environmental consequences	PRV termination is located over three stories up, Assembly points will not be located downwind	Extremely Unlikely (1) : *Negligible (1)* **D**		
7.4.2 What if the machinery room ventilation discharge does not take into account air flow around the building, prevailing winds and surrounding structures such as doors or windows?	The ventilation system operates during a release but discharges the ammonia vapor directly into the employee evacuation area or parking lot.	Potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Assembly areas will be selected based on possible upwind locations	Unlikely (2) : *Moderate (2)* **C**		
7.4.3 What if the control room is not designed and/or sited with consideration of possible process incidents?	A large ammonia release occurs and the refrigeration control room is not accessible to evaluate the situation.	Potential (extended) release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	System does not have designated control room	Unlikely (2) : *Moderate (2)* **C**		
7.4.4 What if the site's normally prevailing wind directions is not considered when situating equipment / populations?	If the wind directions are not considered, the environment / populations could be vulnerable to a release.	Ammonia exposure to facility personnel when ammonia vapor is released into the atmosphere and/or into an area	Locations of the primary and secondary evacuation areas will be selected based on upwind locations	Unlikely (2) : *Moderate (2)* **C**	Incorporate wind awareness training into the EAP, ensuring personnel understand how to use windsocks and select an upwind evacuation area based on real-time conditions.	

7.4.5 What if the machinery room is sited adjacent to a large employee population?	The machinery room is sited adjacent to a large employee population. There is a release, resulting in increased exposure of employees to hazardous consequences.	Ammonia exposure to facility personnel when ammonia is released in the machinery room	Refrigeration system is above ground level and not frequented	Unlikely (2) : *Minor (1)* **C**		

What-if/Checklist Logsheet: Emergency Situation

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
Detection & Ventilation Systems						
8.1.1 What if the emergency ventilation system is non existent, inadequate, or inoperable during an emergency situation?	The emergency ventilation system is non existent, inadequate, or inoperable during an emergency situation, increasing the exposure to hazardous consequences.	The emergency ventilation does not function correctly leading to increased ammonia concentration in the engine room, potentially up to the lower explosion range, putting employees and the facility at risk		Likely (3) : *Moderate (2)* **B**	Ventilation design and design calculation have been reviewed and addressed at part of the ANSI/IIAR 9 MSSE. See recommendations within the report.	
8.1.2 What if the ammonia detectors do not have appropriate setpoints?	If the ammonia detectors do not have appropriate setpoints an ammonia release may not be detected.	Ammonia set-points are not in line with codes and will not alert personnel at the lower levels in order to assess the situation and take appropriate actions to prevent (over)exposure		Likely (3) : *Minor (1)* **C**	Set points were not determined at time of hazard review. Recommendations are listed in the ANSI/IIAR 9 MSSE. See recommendations within the report.	
8.1.3 What if the ammonia detectors are not properly maintained?	If the ammonia detectors are not properly maintained an ammonia release may not be detected.	Preventative maintenance is critical for the function of stationary ammonia detectors, if not properly maintained it will not provide an early detection to plant personnel that they may have to evacuate or be able to take action to stop or slow down a release before it gets bigger	Calibrations will be completed semi-annually as part of PM service agreement	Likely (3) : *Minor (1)* **C**		
8.1.4 What if there are not sufficient ammonia detectors (stationary and hand-held) at the facility?	If there are not sufficient ammonia detectors at the facility an ammonia release may not be detected. There are no hand-held detectors available to personnel; they are unaware of atmospheric concentrations they are working in.	The lack of ammonia detectors in particular areas throughout the facility will not alert plant personnel to a potentially dangerous situation and cannot take preventative measures; i.e. evacuate, defensive actions to slow down the leak, etc.	Ammonia detection is located inside the engine room	Unlikely (2) : *Minor (1)* **C**		
8.1.5 What if an outside ventilation switch could not be identified by personnel during an emergency?	If the ventilation activation is not interlocked with detection or if ventilation is needed and personnel cannot locate the manual switch, concentrations may steadily increase in the engine room.	There is an active ammonia release in the engine room and the ventilation has not been activated yet, and the plant personnel and/or outside agencies want to activate the ventilation to help lower the concentration but cannot locate the switch to activate it which may lead to higher concentrations and potentially an explosive atmosphere		Unlikely (2) : *Minor (1)* **C**	Ventilation switch has not been placed at time of hazard review. This has been captured in the ANSI/IIAR 9 MSSE. See recommendation within the report.	
8.1.6 What if ignition sources are present in a machinery room with an explosive mixture of ammonia?	Ignition sources are present in a machinery room with an explosive mixture and an ignition source causes an explosion.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel; Damage to equipment, plant buildings, and plant personnel	There is a 2% ammonia detector installed (function and setpoint is unknown at time of hazard review)	Unlikely (2) : *Moderate (2)* **C**	The requirement for system shutdown via an ammonia detection interlock was captured in the ANSI/IIAR 9 MSSE. See recommendation within the report.	
Emergency Situation: Emergency Equipment						
8.2.1 What if emergency equipment is non existent, inadequate, inoperable, poorly located, or incorrectly used?	Emergency equipment is non existent, inadequate, inoperable, poorly located, or incorrectly used, resulting in increase exposure to hazardous consequences.	Emergency equipment cannot be utilized to investigate a release or take defensive actions to slow down or mitigate a release which can cause personal injury and a prolonged release	No emergency equipment (APR) will be utilized by facility personnel	Extremely Unlikely (1) : *Severe (3)* **C**		
8.2.2 What if eyewash / safety showers are not located in appropriate locations?	If eyewash / safety showers are not in appropriate locations personnel may not receive proper first aid during an ammonia release.	An employee is exposed to a chemical and cannot locate the closest eyewash to administer first aid and receives chemical burns.		Unlikely (2) : *Moderate (2)* **C**	No eyewash / shower units were installed at time of hazard review. This was captured in the ANSI/IIAR 9 MSSE. See recommendation within the report.	

8.2.3 What if there is an emergency requirement to vent pressure from the vessels in the engine room?	Pressure begins to build and PRVs activate and/or vessels are operating beyond their maximum allowable pressure, causing an ammonia leak.	There is not an emergency pressure control box / system in place to help relieve building pressure from vessels in the engine room; Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment	E-stop (when installed) activation will lower system pressure	Unlikely (2) : *Moderate (2)* **C**		
8.2.4 What if there are no wind socks installed and/or the wind socks cannot be seen at the designated evacuation doors?	There are no wind socks installed at the facility or the wind sock cannot be seen by employees as they exit the evacuation door. The employees may have a hard time determining a safe evacuation route upwind.	Employees may be exposed to an ammonia release if they cannot correctly identify upwind direction.		Unlikely (2) : *Moderate (2)* **C**	No windsocks installed at time of hazard review. This was captured in the ANSI/IIAR 9 MSSE. See recommendations within the report.	

Emergency Situation: Isolation Valves

8.3.1 What if there are no isolation valves and/or emergency shut-off switches for securing the system in event of a emergency situation?	There are no isolation valves or shut-off switches for securing the system in event of a emergency situation. This prevents control and management of the emergency situation, increasing the exposure to hazardous consequences.	With no isolation valves or emergency shut-off switches it would prolong an ammonia release with greater personnel and environmental consequences; Potential increases in system temperature and pressure	Equipment isolation valves are present, e-stops (will be) present, Equipment safeties will shut down equipment if outside safe operating parameters	Extremely Unlikely (1) : *Moderate (2)* **D**		
8.3.2 What if the emergency valves required for emergency shut-down are not clearly and uniquely identified at the valve itself and in the system schematic drawings? Reference IIAR2 5.14.3	The valves are not identified in the field or in the drawings, a release occurs and on-site personnel and/or outside response agencies have a hard time identifying the valves used for shutdown / isolation.	Extended ammonia release; Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel		Unlikely (2) : *Minor (1)* **C**	King valve was not labeled at time of hazard review. This was captured in the ANSI/IIAR 9 MSSE. See recommendations within the report.	

Emergency Situation: Utilities

8.4.1 What if the facility has not planned for a loss of electric power?	The facility has not planned for a loss of electric power. An electrical power outage occurs. There is a refrigeration system upset and pressure increase.	Power is potentially lost for: the control system, emergency ventilation, ammonia detectors, emergency notification systems, etc. this may delay the necessary notification means for facility personnel of an ammonia leak	Power loss = will not run system	Unlikely (2) : *Minor (1)* **C**		
8.4.2 What if the facility has not planned for a loss of facility water?	A loss of facility water occurs without knowledge. The condenser is the only refrigeration equipment reliant on water.	Water potentially may be lost to the condenser, compressor cooling, etc. which may potentially increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment	City for potable water	Unlikely (2) : *Negligible (1)* **D**		
8.4.3 What if there is a chemical or oil leak to ground or storm drain?	Chemical seeps into earth or storm drain and contaminate area.	Oil and/or a chemical leaks and makes its way to a drain either in the engine room or a drain outside which potential may contaminate facility utilities or waters downstream. *Note: Severe based on potential EPA fines	No drains in the engine room	Unlikely (2) : *Moderate (2)* **C**		

Emergency: Responsibilities & Communication

8.5.1 What if there are no assigned responsibilities in the event of an emergency situation?	There are no assigned responsibilities in the event of an emergency situation. Inaction, confusion, or wrong actions results, increasing the exposure to hazardous consequences.	With no assigned responsibilities during an ammonia leak it may lead to no one taking control of the evacuation procedures, headcounts, etc. The responding agencies arrive and no one can give them information concerning the incident. This may lead to injuries, exposure, prolonged release, etc.		Unlikely (2) : *Moderate (2)* **C**	Develop or revise the Emergency Action Plan (EAP) to clearly assign personnel responsibilities in the event of an ammonia release and ensure the plan complies with California Title 8 §3220 requirements. The EAP should include, at a minimum: emergency escape procedures and exit route assignments; procedures for employees who remain to perform critical operations before evacuating; methods to account for all employees after evacuation; identification of rescue and medical duties (if applicable); means of reporting fires and other emergencies; and the names or job titles of individuals responsible for plan coordination and information.	
8.5.2 What if the employee emergency notification system is non existent, inadequate or inoperable during an emergency situation?	The employee emergency notification system is non existent, inadequate or inoperable during emergency situation. This prevents proper initiation of emergency actions (e.g., evacuation, shelter in place), increasing the exposure to hazardous consequences.	This prevents proper initiation of emergency actions (e.g., evacuation, shelter in place) and increase employee exposure during a chemical release	Cell phones, verbal, ammonia detection horn / strobes	Unlikely (2) : *Moderate (2)* **C**		
8.5.3 What if an operator / employee had not received emergency response training?	An untrained operator could respond to a release outside of his assigned responsibility and/or his training capability.	An untrained operator may respond beyond his capabilities and become injured, not be aware of the emergency shutdown procedures / protocol, not be able to don appropriate PPE for defensive actions.	Facility will not perform any offensive or defensive actions in case of an ammonia leak - they will evacuate	Likely (3) : *Moderate (2)* **B**	Upon development of the Emergency Action Plan (EAP), provide training to employees on its contents, assigned responsibilities, and required response actions.	
8.5.4 What if the facility has not coordinated their EAP / ERP with the local responding agencies?	Confusion over rescue, isolation, and evacuation assignments prolong the time required for rescue.	Facility and agencies do not know their responsibilities during an event which may potentially slow down the response efforts both in-house and from outside agencies. This may lead to a slow rescue effort.	Facility is currently working on a plan with local law enforcement	Unlikely (2) : *Minor (1)* **C**		
8.5.5 What if adequate site specific information is not available to outside response agencies when arriving on-scene of an ammonia leak?	Misalignment or mis-identification of valving during a release could cause injuries or could make the release worse.	Inadequate communication may potentially slow down the response efforts both in-house and from outside agencies. Agencies may not be informed of additional hazards located throughout the facility that may pose a danger to personnel.	Site personnel will be notified and communicate, Facility EAP is sent to responding agencies	Unlikely (2) : *Minor (1)* **C**		

Fire Suppression System

8.6.1 What if the fire suppression system is non existent, inadequate or inoperable?	The fire suppression system is non existent, inadequate or inoperable, resulting in an increased exposure to hazardous consequences.	Potential increases in system temperature and pressure which could result in pressures above the maximum allowable pressure rating of the equipment due to the excessive heat and potentially release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Fire system is not installed or required as part of building permit	Extremely Unlikely (1) : *Severe (3)* **C**		

What-if/Checklist Logsheet: Human Factors

PHA Date:	**Process:** Ammonia Refrigeration
Team Leader:	**Reference P&ID:**
Team Members:	

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
9.1.1 What if oil is manually drained or sampled from equipment with pressure on the system?	An employee manually drains/samples oil from equipment. The equipment is under pressure, a valve is left open or the employee is incapacitated.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Compressor oil is pulled when compressor is on	Likely (3) : *Minor (1)* **C**		
9.1.2 What if oil is added to a compressor that is under positive pressure?	Oil is added to a compressor that is under positive pressure and the hose connections, check valves, or pump fails.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Refrigeration contractor uses an oil pump to add oil to compressor, If motor fails, you add oil above oil level line, Check valve is used	Highly Likely (4) : *Negligible (1)* **C**		
9.1.3 What if there are unexplained system noises and no subsequent reporting or response?	There are unexplained system noises and no subsequent reporting or response. The unexplained noises are indicative of a system problem. The non reporting and non response results results in missing an opportunity to catch a condition.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Limited employees at facility - would report to service contractor	Unlikely (2) : *Minor (1)* **C**		
9.1.4 What if the equipment condition and housekeeping is poor?	If equipment condition and/or housekeeping is poor, it could lead to equipment damage or employee injury.	Equipment damage which may lead to potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	No issues to note about housekeeping (new system)	Unlikely (2) : *Negligible (1)* **D**		
9.1.5 What if piping or component storage location is mislabeled or if different material are stored together which are incompatible with ammonia?	Piping and/or equipment bin is mislabeled and consequently, an individual grabs a part that is not compatible with ammonia and it is installed.	Potential for equipment damage due to mis-operation of the equipment; Incompatible material could cause a potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	No ammonia parts kept on-site - contractor would bring parts when needed	Unlikely (2) : *Moderate (2)* **C**		
Human Factors: EE Actions / Task Design						
9.2.1 What if an employee leans a ladder against a line?	An employee leans a ladder against a line. The weight moves the pipe or breaks a service valve or nipple.	Potential for equipment damage which may lead to a potential release of ammonia liquid or vapor into an enclosed space with environmental consequences or hazards to personnel	Use of extension ladders is not anticipated due to installation location - can use A-frame ladder	Likely (3) : *Minor (1)* **C**		
9.2.2 What if a job has unusually high physical / psychological demands during normal or emergency operations?	If task designs/job organization issues have high demands there may be an error during the operation or maintenance of the system.	Increased personnel exposure to ammonia and/or increase risk of employee injury	Facility will not operate system and will rely on outside responders for releases requiring emergency response	Likely (3) : *Minor (1)* **C**		
9.2.3 What if there is no training to address substance abuse or mental health problems?	If supervisors are not adequately trained in substance abuse or mental health recognition there may be an error during the operation or maintenance of the system by an employee with a substance abuse or mental health problem.	Increased personnel exposure to ammonia and/or increase risk of employee injury	Facility personnel does not operate the system or turn valves, Service contractor company has EAP to address substance abuse or mental health issues	Unlikely (2) : *Minor (1)* **C**		
9.2.4 What if an employee steps on an ammonia line?	An employee steps on line and the weight of the damages the insulation or damages a service valve or gauge.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	No need to walk over any piping	Extremely Unlikely (1) : *Negligible (1)* **D**		
9.2.5 What if an employee is stressed due to shift work and overtime schedules?	If employee is stressed there may be an error during the operation or maintenance of the system.	Increased personnel exposure to ammonia and/or increase risk of employee injury	Normal shift is 8 hours, Facility personnel will not operate the system - call contractor in	Unlikely (2) : *Moderate (2)* **C**		

9.2.6 What if human error is not addressed in a task's design?	If human error is not addressed there may be an error during the operation or maintenance of the system.	Increased personnel exposure to ammonia and/or increase risk of employee injury	Human error is evaluated during hazard review, Engineered safeties do not take human intervention	Unlikely (2) : *Minor (1)* **C**		
9.2.7 What if there are not sufficient employees to properly operate the system and respond to system upsets?	If there are not enough employees there may be an error during the operation or maintenance of the system.	Potential (extended) release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Employees do not operate the system, HMI is monitored and has capability for call out under certain conditions	Unlikely (2) : *Minor (1)* **C**	Capture and document the operating conditions, alarm setpoints, and events that trigger notifications through the HMI.	
9.2.8 What if an (contractor) employee's responsibility is not well defined?	If task designs/job organization issues are no well defined there may be an error during the operation or maintenance of the system.	Potential for equipment damage due to mis-operation of the equipment which may increase the potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Employees do not have any responsibilities beyond daily rounds	Unlikely (2) : *Minor (1)* **C**		
9.2.9 What if an employee applies external heat to equipment, piping, valves, etc.?	An employee applies external heat (e.g., steam hose, torch, hot water hose, heat lamp) to equipment (e.g., oil pot), piping, valves, etc. This causes an overpressure.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	If water is needed, it's tepid (hose), PRVs would help relieve pressure, Vent line is left open until ammonia is boiled off	Highly Likely (4) : *Negligible (1)* **C**		
9.2.10 What if there are no procedures for communication between shift changes?	Operators are left without information on equipment and start a compressor or a system that should be offline for maintenance or open a valve that should be closed.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	No multiple shifts and very limited personnel on staff (3)	Unlikely (2) : *Moderate (2)* **C**		
9.2.11 What if the ammonia exposure increases while the operator is using an APR?	An operator is working on a leaking valve and is unaware the concentration in the area is rising. The concentration continues to rise until it exceeds the safe limits of the APR.	Personnel may be exposed to higher levels of ammonia with potential health and safety hazards	Employees do not don an APR	Likely (3) : *Minor (1)* **C**	ANSI/IIAR MSSE recommendation for purchasing a personnel ammonia meter. See recommendations within the report.	
9.2.12 What if maintenance is performed that could result in fugitive emissions without warning nearby personnel?	Personnel over-react believing a release is occurring.	Personnel institute the facility's emergency action plan without the need to evacuate based on lack of knowledge	Verbal communication if applicable (in area)	Unlikely (2) : *Minor (1)* **C**		

Human Factors: Operator/Process Interface

9.3.1 What if the work environment is too cold, noisy, or dark?	The work environment is too cold, noisy, or dark which prevents maintenance and inspections from being performed.	Incomplete required maintenance and/or inspections on equipment which may lead to equipment break-downs, unnecessary equipment wear which could potential cause an ammonia release	Facility issues PPE, Flashlights available, Lights outside	Unlikely (2) : *Moderate (2)* **C**		
9.3.2 What if the refrigeration control indicates a process upset?	Refrigeration control indicates a process upset. Operator does not know the upset has occurred. This prevents control and management of the upset.	Personnel would not be aware of a release of ammonia liquid or vapor into the atmosphere and/or enclosed space and not take steps to prevent environmental consequences or hazards to personnel	Alarms and notifications, HMI monitoring / access available, Engineered safeties, i.e. PRV, etc.	Likely (3) : *Minor (1)* **C**		
9.3.3 What if setpoints are changed without authorization?	Changed setpoint may lead to an error during the operation or maintenance of the system.	Potential increases in system temperature and pressure which may lead to a potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Limited to authorized personnel (North Star and service contractor), Hard set compressor safeties that are set by manufacturer and cannot be changed	Unlikely (2) : *Moderate (2)* **C**		
9.3.4 What if small ammonia leaks or odors are considered unimportant and go unreported?	Small ammonia leaks may become larger and result in ammonia concentrations in the work areas that are a health hazard.	Small nuisance leaks may lead to larger releases of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Incident investigation program is implemented	Unlikely (2) : *Minor (1)* **C**		
9.3.5 What if the ammonia refrigeration system has no recorded log / record of system operating parameters? Reference IIAR6 5.3.6.1	Operating pressure or temperatures that are not recorded and reviewed may become excessive and over design conditions.	Operator has no means to track system operations and may not recognize increases / decreases in temperatures and pressures which potentially may lead to an ammonia leak	Daily rounds are completed, Control system trending	Extremely Unlikely (1) : *Minor (1)* **D**		

9.3.6 What if the control/display layout is confusing?	The control/display layout is confusing causing the operator to make incorrect decisions.	Operator may make the wrong decision, may not be able to locate pertinent information which may lead to an ammonia leak and personnel exposure	Control layout scheme is industry standard	Extremely Unlikely (1) : *Negligible (1)* **D**		
9.3.7 What if the computer systems do not have appropriate protections (i.e. firewalls, virus protection, etc.)?	If the computer systems do not have appropriate protections there could be unintended operations.	Control systems may be manipulated which may cause equipment damage, run equipment outside of safe operating parameters, which all may lead to a potential ammonia leak with environmental and/or personnel consequences	Facility has appropriate protections	Unlikely (2) : *Moderate (2)* **C**		

Human Factors: Organization/Policies

9.4.1 What if human factors support/ expertise is unavailable?	Poor human factors support/expertise may lead to an error during the operation or maintenance of the system.	An error in operation or maintenance of the system which could cause a potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Contractors are available and utilized, Equipment manuals	Unlikely (2) : *Minor (1)* **C**		
9.4.2 What if there is no mechanism for employees to express human factor related concerns?	No mechanism for employees to express human factor-related concerns may lead to an injury or exposure.	An error in operation or maintenance of the system which could cause a potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Only 3 employees and would discuss amongst themselves	Unlikely (2) : *Minor (1)* **C**		
9.4.3 What if human factors issues are not systematically addressed by management? No follow-up and/or communication.	If human factors or safety issues are not addressed by management, it may expose personnel to safety and/or chemical hazards.	An error in operation or maintenance of the system which could cause a potential release of ammonia liquid or vapor into an enclosed area which could pose a hazard to personnel	Employees who identify concerns are responsible for addressing or reporting them	Unlikely (2) : *Minor (1)* **C**		
9.4.4 What if no investigations or incident follow-ups are done for ammonia releases or near-hit incidents?	Investigations and follow-ups do not identify corrective or remedial safety measures that are needed to prevent re-occurrence of accidents.	Without follow-ups or corrective actions, past incidents may potentially be repeated	Incident investigation program / policy is in-place, Refrigeration contractor assists in investigations	Unlikely (2) : *Minor (1)* **C**		

Human Factors: Process Information

9.5.1 What if process information is not clear, concise, and/or accessible?	Process information is not clear, concise, and/or accessible, causing operator to make incorrect decisions.	Process equipment may be ran outside safe or normal operating temperatures / pressures which may have environmental or personnel hazards	Safety information has been developed and kept in system binder and/or electronically	Unlikely (2) : *Minor (1)* **C**		

Human Factors: Training/Education

9.6.1 What if employee training is not documented?	If employee training is not documented and employee is assigned to a task for which he is not adequately trained there may be an error during the operation or maintenance of the system.	If training is not documented and an error / release happens, the facility cannot prove that the employee had the knowledge, skills, and ability to carry out the task assigned; If it is not documented, it didn't happen		Likely (3) : *Minor (1)* **C**	Create a daily round procedure to accompany the daily round sheet and document employee training on this procedure.	
9.6.2 What if employee training does not make adequate use of hands on exercises or job simulations?	Individuals learn differently. If multiple training methods are not utilized, an individuals comprehension may be lacking.	Without an adequate use of hands-on training and performance assurance, the facility will not have confidence that work tasks will be consistently completed to minimum acceptable standards with accepted procedures and practices	Employees will be trained on the system operation once the system is operational	Unlikely (2) : *Minor (1)* **C**		

Human Factors: Written Procedures

9.7.1 What if employees and/or contractors are not involved in the initial procedure development and subsequent review?	Employee(s) are not involved in procedure development/review and the procedure is incorrect which may result in an error during the operation or maintenance of the system for inexperienced operators.	Procedures may not be accurate and error in operation may lead to an ammonia release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel		Extremely Unlikely (1) : *Minor (1)* **D**	Develop written operating procedures for the system that incorporate applicable Risk Management Program (RMP) requirements and relevant provisions of ANSI/IIAR 7.	

9.7.2 What if there are no procedures for some and/or all operations / maintenance activities? i.e. oil drain, etc.	There are missing procedures for system operation and/or maintenance activities. The lack of procedures leads to an individual to perform the operation or maintenance incorrectly.	With no procedures, an employee may not properly operate system equipment, the facility cannot train the employee for the task and ensure he can safely execute the task, and errors can lead to personnel injury and potential exposure due to ammonia leak		Likely (3) : *Minor (1)* **C**	See recommendation 9.7.1	
9.7.3 What if a procedure is not periodically reviewed and updated?	The procedure is not reviewed periodically, i.e. after a modification, etc. and the procedure is incorrect which may lead to improper system operation. Annual procedure certification, a requirement for a program 3 RMP facility, is not completed which puts the facility in jeopardy of a citation.	Procedures are not certified annually or periodically reviewed, and changes have been made, the procedure is not accurate or up-to-date and errors are made in operation which may lead to an ammonia release	Review requirement is listed in the newly developed RMP program	Likely (3) : *Minor (1)* **C**		
9.7.4 What if site safety rules and/or operating procedures are not adhered to?	Employees may be placing themselves in danger and risk the possibility of an ammonia release.	If safety rules or procedures are not adhered to, it can increase the risk of personal injury, exposure, etc.	Progressive disciplinary for employees, Contractor company would be notified of infraction	Likely (3) : *Minor (1)* **C**		

What-if/Checklist Logsheet: Site Specific & Facility / Industry Incidents

PHA Date:	1/28/2020	**Process:**	
Team Leader:		**Reference P&ID:**	
Team Members:			

Item / Question	Scenario	Consequences / Hazards	Controls	Risk Ranking Before	Recommendations	Risk Ranking After
10.1.1 What if an operator overrides the evaporator timing set points for an evaporator?	An operator overrides the hot gas defrost process and introduces ammonia into evaporator (Millard). An operator changes the pump out or bleed time to 0 mins / seconds.	Equipment damage resulting in a potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space	Hot gas is not used in the system	Extremely Unlikely (1) : *Moderate (2)* **D**		
10.1.2 What if the facility has a valve that is part of a recall?	A valve manufacturer issues a recall on a particular valve. The facility does not have the means to know if that valve is installed in their system.	Potential release of ammonia liquid or vapor into the atmosphere and/or enclosed space with environmental consequences or hazards to personnel	Service contractor would look through the system to determine if valve manufacturer and type is installed in the system	Unlikely (2) : *Moderate (2)* **C**		

Checklist

EXTERNAL EVENTS CHECKLIST
Noyo Harbor District

No.	Event	Is this event possible? (Y / N)	If yes, clarify likelihood and potential consequences	Has this event ever happened at this facility? (Y/N)	If yes, how often, when, and what were the consequences?	Recommendations
1	Aircraft impact	Y	Likelihood is very low with potential to damage refrigeration system and building structures – City / County would implement ERP for event	N	---	No recommendation
2	Avalanche	N				
3	Coastal erosion	N				
4	Drought (low lake or river level)		Likelihood is low with potential to impair electrical, control, and floor-mounted mechanical equipment Water fluctuates between 9' to -2'; Engine room is three stories up	N	---	No recommendation
5	Extreme winds, hurricane, tornadoes	Y	Likelihood of extreme winds is high with potential to damage outside equipment / structures Engineered structure to stand up to winds up to 140 mph sustained winds	Y	Annually with potential for 30 knot wind gusts No consequences as structure was just installed	No recommendation
6	Fire: On-site	Y	Likelihood is low with potential to increase refrigeration system pressure and damage building Decking is the only flammable material; Fire extinguisher in unit and around harbor	Y	Not often and has only been vessels (ship) fires – no consequences anticipated	No recommendation
7	Fire: Brush fire, wildfire	Y	Likelihood is very low with potential to damage structure Concrete around immediate area; Forest / area is damp	N	Wildfire about 40 miles from area	No recommendation
8	Flooding: External (high tide, high lake level, high river stage)	Y	Likelihood is very low with potential to impair electrical, control, and floor-mounted mechanical equipment No flooding reach over embankment – 1' above FEMA 100 year flood plain	N	---	No recommendation

No.	Event	Is this event possible? (Y / N)	If yes, clarify likelihood and potential consequences	Has this event ever happened at this facility? (Y/N)	If yes, how often, when, and what were the consequences?	Recommendations
9	Flooding: Internal	N	Likelihood is low with potential for standing water Parking lot was recently redesigned to redirect water better	N	---	No recommendation
10	Fog	Y	Likelihood is very high with limited to no impact to refrigeration system	Y	Annually during winter with no negative consequences anticipated	No recommendation
11	Frost, snow, ice cover	Y	Likelihood is very high with potential for water lines to break, build ice and impede condenser fans High may be in the 20s / low 30s a few hours (2-7 am)	Y	Annually during winter with no negative consequences anticipated	No recommendation
12	Hail	Y	Likelihood of pea size hail is high with potential to lightly damage outdoor insulated piping or equipment	Y	Annually in the winter / spring with no negative consequences anticipated	No recommendation
13	High summer temperature	Y	Likelihood is low with potential to increase system pressures which would safely shut equipment down once it is exceeded Temps may be 80F – a few days with average summer temps are 70F	Y	Every few years with no negative consequences anticipated	No recommendation
14	Industrial or military accident	N				
15	Landslide	Y	Likelihood is moderate for a landslide outside of the area (Hwy 2 and Hwy 1) – within basin uncommon	N	---	No recommendation

No.	Event	Is this event possible? (Y / N)	If yes, clarify likelihood and potential consequences	Has this event ever happened at this facility? (Y/N)	If yes, how often, when, and what were the consequences?	Recommendations
16	Lightning	Y	Likelihood is high with potential for lightning to strike outdoor equipment with little to no impact on refrigeration system	Y	Once or twice a year (Distant not overhead) with no negative consequences anticipated	
17	Low winter temperature	Y	Covered in #11 – no additional information to add			
18	Meteorite impact	N				
19	Missile impact	N				
20	Nearby pipeline accident	N	PG&E gas line stops at Willits (See map on last page)	N	---	No recommendation
21	Release of chemicals from storage	N	No chemical storage currently	N	---	No recommendation
22	River diversion	N				
23	Sabotage / terrorist attack		Likelihood is low to moderate as the area is open to public due to harbor access Doors will lock when they close, lock on the chain-link gate going to level 2 and 3, cameras in area, Law enforcement patrol area at least twice a shift (nighttime shift)	N	---	The facility is currently evaluating the feasibility of installing solar-power security lighting. This recommendation remains in progress and will be carried through to completion.
24	Sandstorm	N				
25	Seismic activity	Y	Seismic evaluation was a part of permitting process	N	No earthquakes have been felt in area for years	No recommendation
26	Theft	Y	Covered in #23 – no additional information to add			
27	Transportation accident: highway or rail	N	There is not a highway or railway near the ammonia system			

No.	Event	Is this event possible? (Y / N)	If yes, clarify likelihood and potential consequences	Has this event ever happened at this facility? (Y/N)	If yes, how often, when, and what were the consequences?	Recommendations
28	Transportation accident: on-site delivery	Y	Likelihood is high since it is public roadway with no consequence anticipated since the ammonia system is set back from the parking lot	N	---	No recommendation
29	Volcanic activity	N				

PG&E Gas Line Map

Recommendations

Note: Recommendations are tracked electronically, outside of this table

	Item	Recommendation
B	2.4.2	Develop a written oil draining procedure consistent with ANSI/IIAR 7 requirements. The procedure should address isolation steps, the duration required to allow residual ammonia to boil off prior to draining, coordination with the contractor's limited on-site duration, and whether water-assisted methods will be utilized.
B	3.3.1	Verify that the high-level float interlock initiates compressor shutdown upon detection of a high liquid level condition.
B	3.3.2	See ANSI/IIAR 9 recommendation for the documentation of the high level float testing.
B	8.1.1	Ventilation design and design calculation have been reviewed and addressed at part of the ANSI/IIAR 9 MSSE.
B	8.5.3	Upon development of the Emergency Action Plan (EAP), provide training to employees on its contents, assigned responsibilities, and required response actions.
C	1.1.2	Develop and implement a standardized Daily Rounds Inspection Form for the refrigeration system. The form should include documentation of equipment operating condition, oil levels, receiver and vessel levels (e.g., ammonia levels where applicable), system pressures and temperatures (as appropriate), unusual noises or vibration, visible leaks, abnormal odors, and general housekeeping conditions. Completed forms should be retained in accordance with the facility's recordkeeping requirements.
C	1.2.2	Include in the offloading procedure measures to control vehicle and pedestrian traffic during cylinder transfer activities, such as the use of cones, caution tape, or temporary barriers to prevent interference with the operation.
C	1.2.7	Include a step in the procedure to verify the manufacture or change-out date of the ammonia-rated hose and confirm it remains within the allowable service life (replacement required every five years).
C	1.3.1	Create a master PRV list is created to meet ANSI/IIAR 6-2019, Section 5.3.3: PRV manufacturer, PRV model number and set pressure, and where applicable, model number and installation / replacement date.
C	1.3.2	Request documentation on the PRV design and design calculations to ensure they meet the requirements of ANSI/IIAR 2-2021.
C	2.2.1	Evaluate operational conditions and establish a defined defrost schedule for the ice maker to support efficient operation and prevent excessive ice buildup.

	Item	Recommendation
C	4.1.8	Perform and document weekly inspection of compressor shaft seal leak rates in accordance with ANSI/IIAR 6, Section 6.1. Documentation may be incorporated into the daily rounds sheet or maintained through other established record keeping methods.
C	6.5.1	The pressure relief valve (PRV) punch cards do not reflect the correct installation year (2026) and currently indicate 2025. Request that the contractor replace the punch cards and mark the correct installation month and year.
C	7.2.1	Create an EAP and create an evacuation map for the facility (currently working with law enforcement on this).
C	7.4.4	Incorporate wind awareness training into the EAP, ensuring personnel understand how to use windsocks and select an upwind evacuation area based on real-time conditions.
C	8.1.2	Set points were not determined at time of hazard review. Recommendations are listed in the ANSI/IIAR 9 MSSE. See recommendations within the report.
C	8.1.5	Ventilation switch has not been placed at time of hazard review. This has been captured in the ANSI/IIAR 9 MSSE. See recommendation within the report.
C	8.1.6	The requirement for system shutdown via an ammonia detection interlock was captured in the ANSI/IIAR 9 MSSE. See recommendation within the report.
C	8.2.2	No eyewash / shower units were installed at time of hazard review. This was captured in the ANSI/IIAR 9 MSSE. See recommendation within the report.
C	8.2.4	No windsocks installed at time of hazard review. This was captured in the ANSI/IIAR 9 MSSE. See recommendations within the report.
C	8.3.2	King valve was not labeled at time of hazard review. This was captured in the ANSI/IIAR 9 MSSE. See recommendations within the report.
C	8.5.1	Develop or revise the Emergency Action Plan (EAP) to clearly assign personnel responsibilities in the event of an ammonia release and ensure the plan complies with California Title 8 §3220 requirements. The EAP should include, at a minimum: emergency escape procedures and exit route assignments; procedures for employees who remain to perform critical operations before evacuating; methods to account for all employees after evacuation; identification of rescue and medical duties (if applicable); means of reporting fires and other emergencies; and the names or job titles of individuals responsible for plan coordination and information.
C	9.2.7	Capture and document the operating conditions, alarm setpoints, and events that trigger notifications through the HMI.

	Item	Recommendation
C	9.6.1	Create a daily round procedure to accompany the daily round sheet and document employee training on this procedure.
D	1.2.1	In the offloading SOP, ensure to include the proper cylinder handling procedures and required PPE.
D	1.2.4	Create an offloading procedure that includes the requirement to request the certificate of conformity to ensure that the ammonia meets the IIAR purity standards.
D	1.2.5	Develop an offloading procedure requiring that cylinder transfer activities be continuously attended by both the contractor and facility personnel until the task is complete.
D	4.3.5	Create an oil drain log which will list the amount of oil in and amount of oil drained.
D	5.1.7	Assess water quality to determine the appropriate condenser water treatment chemicals and dosing program necessary to minimize scale buildup and support efficient condenser operation.
D	6.5.3	Ensure a cap is placed on top of PRV termination point to prevent water from entering piping.
D	9.7.1	Develop written operating procedures for the system that incorporate applicable Risk Management Program (RMP) requirements and relevant provisions of ANSI/IIAR 7.

Staff Reports

Geotechnical Boring Schedule

Drillers will be onsite to drill 8 holes to develop a geotechnical report September 14-20th. This boring is part of the marina redevelopment project and the Tsunami Damage pile replacement project and can also be used to inform the FEMA pile replacement project. The late drilling schedule does mean that we will not be able to get the piles replaced this season and will have to wait until June of 2027 for the piles to be installed. While this delay is not ideal it will hopefully allow FEMA to approve our pile replacement project, which has stagnated in the FEMA system.

Vessel Demo Project

We completed with the Vessel Demo Project and are waiting on final invoices from Melvin and C&S Waste. Overall the project looks like it will be completed on budget. In addition the $70,000 the Harbor Commission allocated to this project. TJ Louderback donated $8,000 to see vessels abated within the Noyo Harbor Marina. To date, the District has spent $43,549.49 to dismantle vessels, averaging $8,000 per vessels. This is cheaper than hiring contractors who were charging $20,000-$30,000 per vessel.

USACE Dredge and Jetty Repairs

The Army Corp of Engineers will be meeting in Fort Bragg on August 13th and 14th to discuss their upcoming dredging and repairs to the Noyo Jetty. The Harbormaster will give an update at the commission meeting as to how the meetings went.